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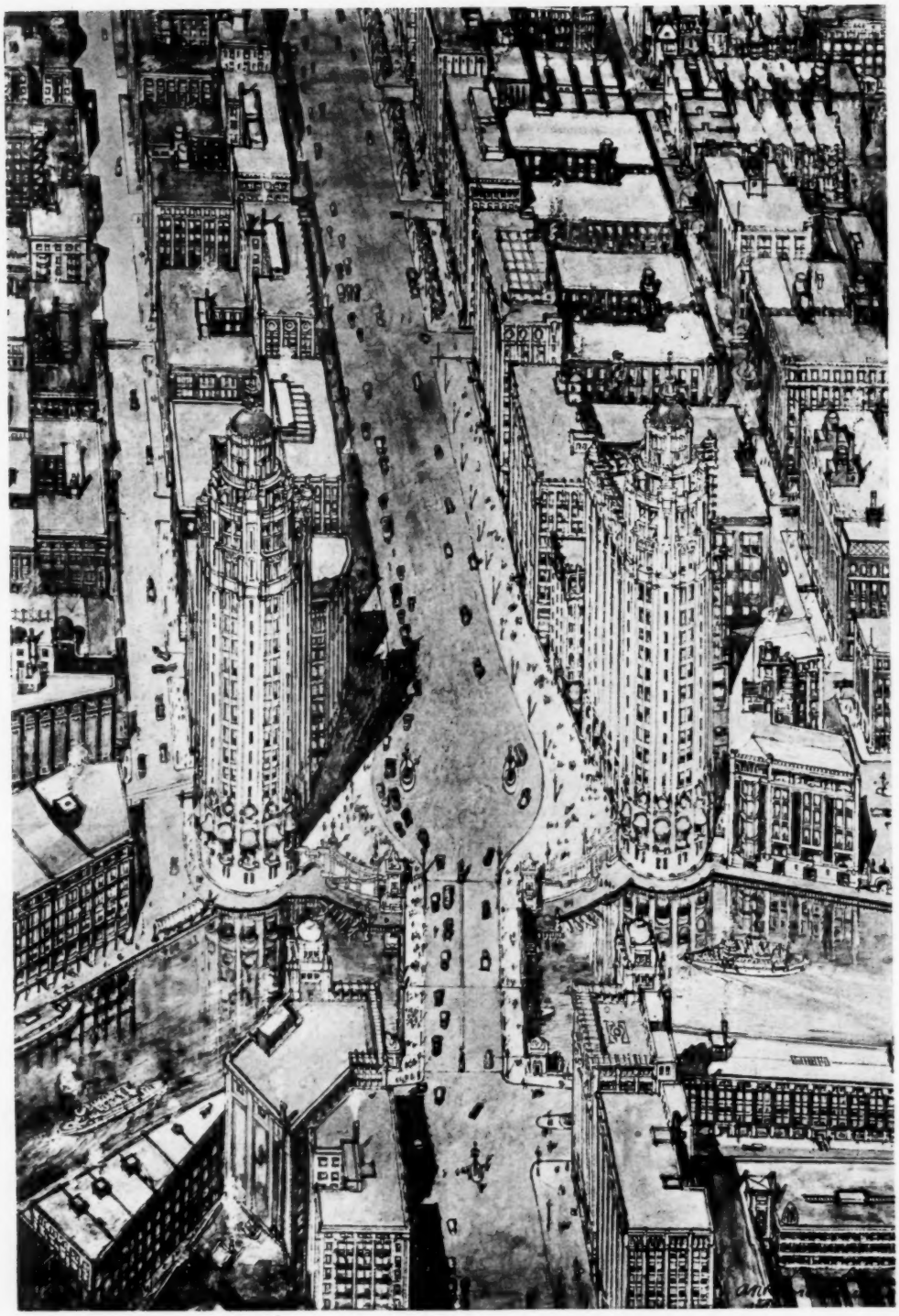

GATEWAY TO NORTH MICHIGAN AVENUE, LOOKING NORTH

THE NORTH MICHIGAN AVENUE DEVELOPMENT, CHICAGO, ILL.

DRAWING BY A. N. REBORI

THE AMERICAN ARCHITECT

VOL. CXIV WEDNESDAY, DECEMBER 11, 1918 NUMBER 2242

SUGGESTION FOR MONUMENTAL TREATMENT—NORTH PLAZA FROM CHICAGO RIVER
DRAWING BY HOLABIRD & ROCHE, *ARCHITECTS*

The North Michigan Avenue, Chicago Development

Illustrated by reproductions of original drawings by Holabird & Roche, A. N. Rebori and Vernon Howe Bailey

MUCH has been written of the public good that can be accomplished by the architectural profession in all communities through its alliance with and influence on the larger measures for civic development and improvement, especially as relating to streets and buildings. It is recognized that the greatest opportunity exists where a City Plan has been determined upon and provision made for its execution.

The City Plan of Chicago, which owes so much to the genius and public spirit of the late D. H. Burnham, has, in its first great step—its development of North Michigan Avenue—presented such an opportunity to Chicago architects, and they have promptly and generously responded to its call.

Early in the present year the North Central Business District Association (the name of which has since been shortened to North Central Association), an organization comprising the principal property owners of the section most affected by this extension, acting with the approval of the Chicago Plan Commission, invited a number of architects to meet with a committee of its organization with a view to enlisting their interest in a predetermination, so

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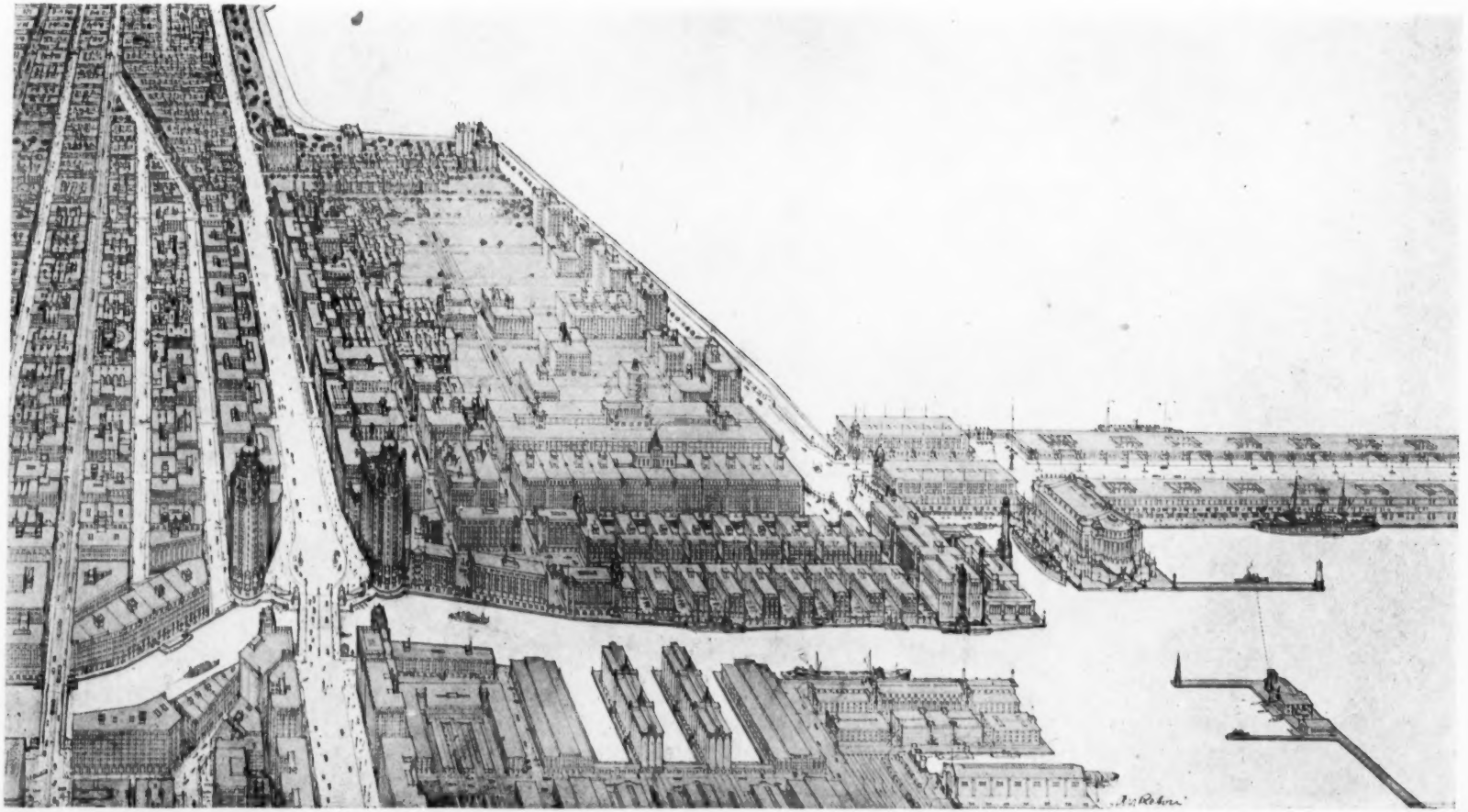
far as possible, of the architectural treatment most desirable as a means of establishing the character of this most important link between the downtown "loop" section and the foremost residential district of Chicago. This resulted in the formation of a committee consisting of the architects whose names are signed to the report published herewith and whose studies of the subject are illustrated in this number of THE AMERICAN ARCHITECT, as delineated by A. N. Rebori and Vernon Howe Bailey, with the exception of a sketch by Holabird and Roche, which is reproduced directly from the original.

LOOKING NORTH FROM BRIDGE SHOWING MONUMENTAL ARCH TREATMENT
DRAWING BY A. N. REBORI

The architects of this committee agreed to apply their services to the proposed undertaking without charge, the property owners making themselves responsible for expenses incurred, and a work went forward which promises to be of far-reaching influence upon the architectural future of Chicago, and, indirectly, on that of other cities which may profit by its experience.

This work of the Architects' Committee may appropriately be termed an experiment in architectural eugenics, since it is an effort to influence the architectural character of a street before its birth; or at least before its re-birth as a boulevard. It is to be understood also that this is intended to have a very definite relation to the character of occupancy of the future buildings fronting on this street. By combining standards of architectural treatment with restrictions as to the kinds of business for which the buildings may be used, the owners of the extremely valuable frontage on this street hope permanently to maintain its position as a "quality street," preserving it from the deterioration or demoralization that often overtakes some downtown sections in rapidly growing American cities.

To this end a voluntary agreement of binding



GENERAL PERSPECTIVE LOOKING NORTH, SHOWING AREA AFFECTED BY NORTH MICHIGAN AVENUE EXTENSION

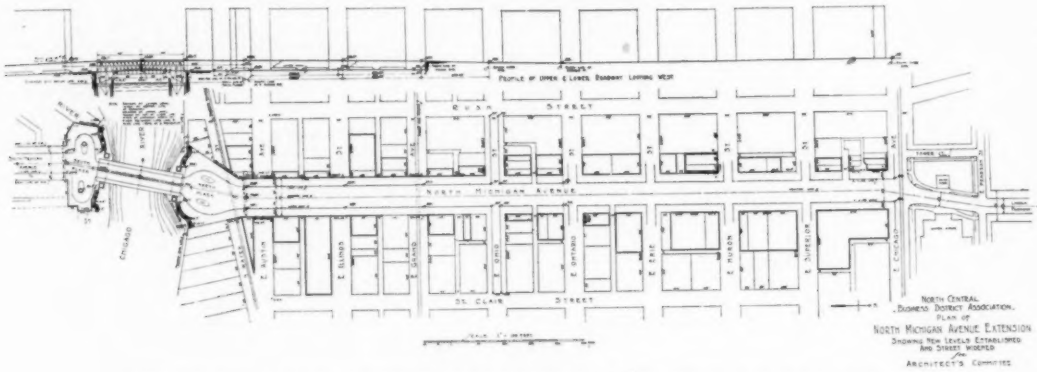
THE NORTH MICHIGAN AVENUE DEVELOPMENT, CHICAGO, ILL.

DRAWING BY A. N. REBORI

character has been entered into by a considerable majority of the property owners, to which the remainder are expected to subscribe shortly, providing such restrictions as will effectively limit the occupancy and uses of the buildings to such businesses as will enhance rather than in any way jeopardize the street's possibilities as a location for high-grade shops, hotels, theaters, office buildings and other dignified business purposes.

by a double-deck bridge, now under construction, the upper level for light traffic and the lower for heavy. The inclined approaches to the upper level of the bridge will clear the cross streets adjacent to the river on both sides, and also the railroad tracks on the north, permitting east and west traffic without crossing the light vehicle roadway.

Thus is provided a broad and unbroken thoroughfare between downtown Michigan Avenue and



NORTH MICHIGAN AVENUE EXTENSION ACCORDING TO ORDINANCE

The importance and value of the North Michigan Avenue development, sometimes referred to as the Boulevard Link, is apparent to anyone acquainted with Chicago streets. From Twelfth Street on the south to Randolph Street on the north, Michigan Avenue is 130 feet wide. From Randolph to the river, which was its northern terminus, it was only 66 feet wide. It has now been widened to 130 feet. Beyond the river, swinging a little to the east, it follows what formerly was Pine Street, which has been widened to 141 feet. The river will be crossed

Lake Shore Drive to relieve the intense and constantly increasing congestion which has existed north of Randolph Street with its focal point at the old Rush Street bridge, which has furnished its only passage across the river. The contribution of the Architects' Committee toward the prospective development, in beauty and character, of this notable street, and of its relation to the City Plan, is a work which must inevitably redound to the credit of the profession and stand as a worthy example of its public spirit.

Report of the Architects' Committee, North Michigan Avenue Development to the North Central Association, Chicago

Submitted November 1, 1918

YOUR committee has made extensive studies in connection with the widening and extension of North Michigan Avenue and it is believed has exhausted every possibility, both as to actual development of the property according to ordinance and as to further development beyond the limitation of ordinance.

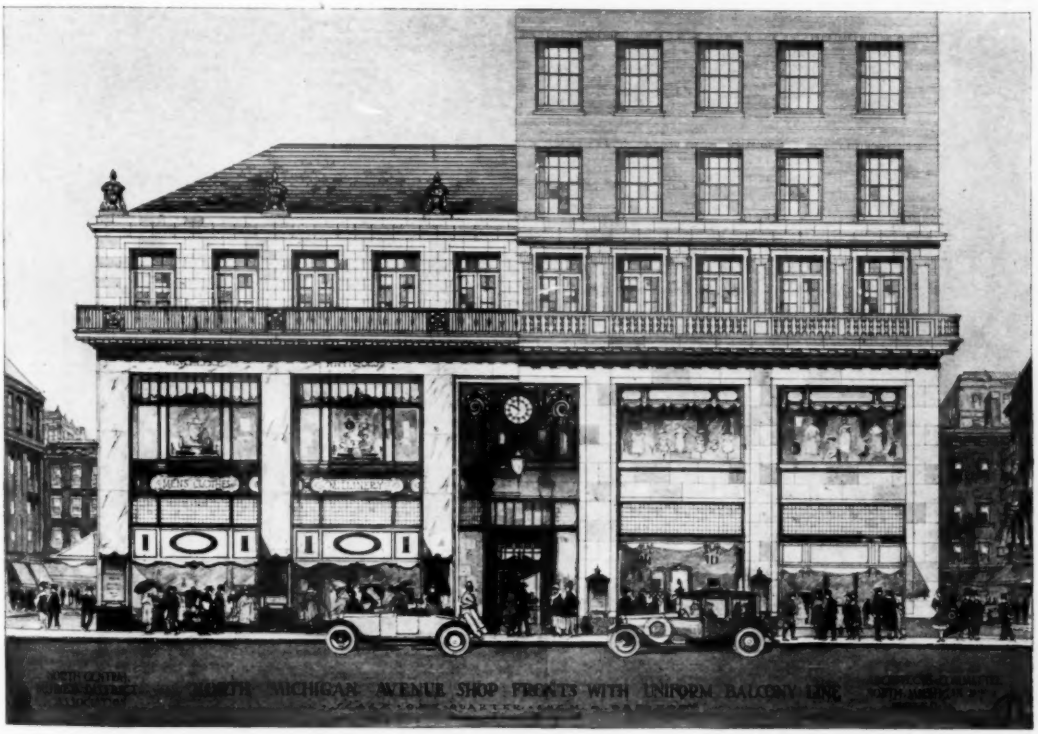
Two plans therefore are outlined in this report, one covering the development which will be made possible by:

(a) Agreement on certain elements in the design and general character of the architecture.

(b) Development beyond the limitation of ordinance.

Illustrating Plan (a) and showing the character of North Michigan Avenue according to ordinance, with slight modification, we submit the following drawings:

1. Aeroplane view looking north on Michigan Avenue from the Chicago River.
2. Looking south on Michigan Avenue from Water Tower, showing uniform height of buildings.
3. Looking north on Michigan Avenue from Ontario Street, showing continuous balcony line.
4. Looking south on Michigan Avenue, showing uniform balcony line with unrestricted building height.
5. Looking south across north plaza towards south plaza.
6. Christmas shopping at night on North Michigan Avenue.
7. South plaza, looking south from bridge.



UNIFORM BALCONY TREATMENT AS APPLIED TO HIGH OR LOW TYPE OF BUILDING

DRAWING BY A. N. REBORI

8. Gateway to North Michigan Avenue, looking north from Chicago River.

9. General perspective of area fed by North Michigan Avenue extension.

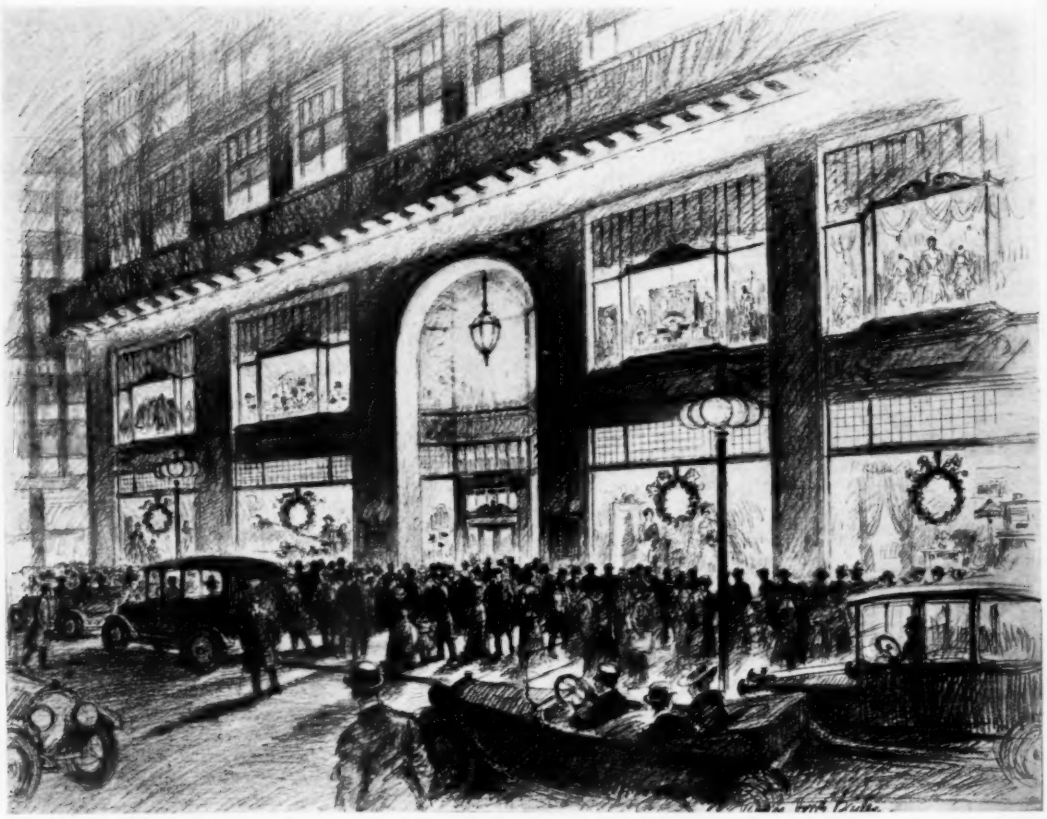
10. Plan showing Michigan Avenue extension.

11. Elevation of buildings with uniform balcony line.

The realization of these views is made possible by the addition to the property owners' agreement of the following recommendations:

1. Restricting Height of Buildings.

As there are no existing laws controlling the height or character of buildings fronting on this or any other avenue in Chicago, with the exception of the two hundred (200) foot height restriction, it is clearly in the hands of the property owners themselves to prevent North Michigan Avenue from becoming a failure in its general effect. We therefore recommend that the height of buildings of a permanent nature to be hereinafter erected along the improvement be limited by property owners' agreement to ten stories, with the uniform height of one hundred forty (140) feet from sidewalk to roof-line. This restriction we believe will maintain the highest standards of occupancy and stimulate rapid growth in property values.



CHRISTMAS SHOPPING AT NIGHT ON NORTH MICHIGAN AVENUE, SHOWING UNIFORM LIGHTING AT BALCONY

DRAWING BY VERNON HOWE BAILEY

2. Uniform Balcony Line.

In order to unify the architectural treatment of the buildings along the entire street we recommend that a continuous balcony with 2 ft. 6 in. projection be established over the lower two shop stories and 36 ft. from the sidewalk to the top of balcony rail. This balcony will afford a strong architectural emphasis close enough to the sidewalk to be of real artistic and commercial value, besides creating a distinctive tie between buildings. Where the

NORTH PLAZA LOOKING NORTH FROM BRIDGE, SHOWING RAMPS TO RUSH AND ST. CLAIR STREETS

THE NORTH MICHIGAN AVENUE DEVELOPMENT, CHICAGO, ILL.

DRAWING BY A. N. REBORI

avenue is on inclined plane from East Ontario Street to Chicago River the top of the 36 ft. uniform balcony to be determined as follows:

Block between East Ontario Street and East Ohio Street at Ohio Street corner. Between East Ohio Street and East Grand Avenue at the center of the block. Between East Grand Avenue and East Illinois Street at the center of the block. Between East Illinois Street and East Austin Avenue at the north side of Austin Avenue.

3. Vacating Alleys.

We recommend that the alleys traversed by North Michigan Avenue incline be closed to a depth of 75 ft. from the North Michigan Avenue building lines, east and west and in height 36 ft. above sidewalk to the established balcony line. Also that this alley space be leased by the city to the North Central Business District Association and that the cost of the improvement of these alley spaces be borne by the association, and the revenue derived from this source be applied to a permanent fund for the benefit of the improvement.

4. Depression of Northwestern Tracks.

We recommend that the Northwestern tracks in North Water Street be depressed so as to eliminate crossing at grade and that three tracks be installed to serve the territory east.

5. Vacating North Water Street.

We further recommend that North Water Street from Rush Street to its intersection at East Austin Avenue be closed and adjustment of property area involved be arranged with the city, thereby permitting an advantageous rearrangement of the north plaza.

As a summary of the five recommendations embraced in Plan (a) we find that:

1. Restricting height of building rests entirely with the property owners.

2. Uniform balcony line requires an order from the city, or, in case the avenue is placed under the jurisdiction of the park systems, an order from the Lincoln Park Commissioners. It should be a simple matter to obtain this order, provided a majority of the property owners affected apply for same.

Three, four and five are matters for negotiation with the city. Your committee is of the opinion that the adoption of all the recommendations are of vital importance leading to the realization of North Michigan Avenue as a truly great thoroughfare and shopping district.

Plan (b)

Many studies were presented by individual members of your committee, showing the possible development beyond the limitations provided for by ordinance.

A great number of these schemes were carefully considered and the following drawings were selected as part of this report.

12. Co-operative plan and elevation showing occupancy on a basis of mutual interest.

13. Looking north from bridge showing Memorial Arch at north plaza.

14. Suggestion for monumental treatment of north plaza perspective.

15. North plaza looking north from the bridge, showing ramps from Plaza to Rush and St. Clair Streets.

Your committee feels that the matter of affording direct communication from the upper level of North Michigan Avenue to Rush Street and St. Clair Street at the north plaza is one of far-reaching importance, and therefore particularly calls your attention to a solution of this problem as shown on Plan 12 and drawing No. 15.

There are two methods of achieving this plan:

1. By the pooling of all property affected.

2. By condemnation for park purposes by the city of the property bounded on the north by East Austin Avenue, on the south by the Chicago River, on the west by Rush Street, and on the east by the continuation of St. Clair Street to the river.

It is important at this particular time in contemplating the improvements proposed for North Michigan Avenue to call attention to the plaza areas immediately north and south of the proposed new Michigan Avenue bridge over the Chicago River.

It is obvious that the treatment of both of these areas should be in certain harmony both in plan and architecture, so that the new Michigan Avenue bridge will form the connecting link and correlate the two areas, thus making a grand unit of city plan at this important location. Undoubtedly here exists an opportunity that should be embraced, encouraging the proper development of the civic improvement idea.

It should be borne in mind that the new Michigan Avenue bridge now under construction is to be monumental in treatment, employing architectural design and pylons and the use of bronze statuary to typify great events historical of Chicago and the nation; and will cost upwards of three million five hundred thousand dollars.

Unfortunately the area immediately north of the Michigan Avenue bridge is now defined by ordinance and, as shown on the plan, is too limited and irregular in outline to obtain the plaza that the situation demands. The architects' committee has therefore suggested an additional drawing and design indicating the proper solution for the north plaza which, if executed, will obtain the effect desired and will make both the north and south sides of the

Michigan Avenue Bridge and the Chicago River a grand architectural ensemble worthy of the Chicago of the future.

In addition to suggesting additional area necessary at this particular point, the plan also makes it possible for the adjacent streets to reach the upper level of the boulevard over the bridge and thus bring the districts surrounding the plaza into direct access to the North Michigan Avenue improvement. This plan as suggested would undoubtedly have a great influence on the North Michigan Avenue improvement both commercially and artistically, and would be well worthy of the effort necessary to achieve this result.

We recommend to your association the appointment by the architects of a sub-committee to assist you with advice and suggestion in the carrying out of the plans here presented. These plans have the approval and endorsement of the Illinois Chapter of the American Institute of Architects and their committee on municipal art.

Respectfully submitted:

ARCHITECTS' COMMITTEE, NORTH MICHIGAN AVENUE DEVELOPMENT.
E. H. Bennett,
Coolidge and Hodgdon,
Graham, Anderson, Probst and White
Holabird and Roche,
Jarvis Hunt,
Marshall and Fox,
George W. Maher,
Mundie and Jensen,
Perkins, Fellows and Hamilton,
A. N. Rebori,
Schmidt, Garden and Martin
Howard Shaw.
HOWARD SHAW, Chairman.
A. N. REBORI, Managing Architect.

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Notes on Reconstruction

Caulking the Leaks

AT no time since the subject of conservation was first discussed in this country have the matters referring to the husbanding of our national resources been of greater importance. While we have during the past three years practically fed to Europe a large part of our vast resources, the fact that we shall undoubtedly be called on to continue to do so, and even to a greater degree than during the war, should cause us to regard the conservation of everything we produce with serious consideration.

Just now the question of the economic waste due to unusual methods during our conduct of the war becomes the first and all-important one. It is in this direction that the greatest loss will be found. In the multiplicity of vital problems which confronted the Government on the signing of the armistice, the cancellation of war contracts loomed big and bulky. A policy based on the theory that the transition from a war to a peace basis should be gradual is in the main a sound one, but no policy that contemplates an avoidable waste can come within that distinction. Such a policy of gradual return to an ante-war condition would not, it is believed, receive concurrence by the business elements of the country. Business in this country never has rested quietly, and never will, under deferred legislative action. It wants all the cards, face up, on the table. It wants to be apprised at the very outset just what governmental action will be. The adaptability of business has been many times shown, and the little danger that lurks in a policy of frankness gives no excuse for any delay on the part of the Government in matters that are so vital to our well developed economic future.

It is therefore evident that while the cancellation of the large unfilled war contracts which would needlessly consume large amounts of our material might work individual hardships, the grand result would be one of national conservation. For that reason these contracts should be cancelled.

The Iron Age, discussing this condition in a recent editorial, makes the well-sustained point that "the idea that demobilization of industry must proceed at a gradual pace is utterly uneconomic." It directs attention to the indisputable fact that in many, if not the majority of cases, much of the product of these contracts, while of first importance during war, will now be practically useless. Continuing on this subject, the editorial states:

"Weapons and materials of war already in the hands of this Government in France or awaiting shipment on this side, represent hundreds of millions of dollars, and but a small part of all this will ever be used in war. Within the past week, considerable steel has been shipped from mills to forging plants preparatory to its use for shells. The British Government stopped receiving such material more than ten days ago, so far as Canadian plants were concerned. It has also issued orders that no shells shall be received from Canadian finishing plants after Dec. 14. In view of the cancellation provisions in the contracts of our own Government, it is past understanding that the policy at Washington should be even more lax than that of Great Britain."

The political element introduced into this discussion, where special interests seek at the expense of the nation to continue a line of manufacture the need for which has ceased, is that of labor—a favorite vote-getting practice.

Cancellation of these useless contracts would of course work periods of temporary unemployment for a small percentage of the country's workers, but the natural readjustment would entail so few serious conditions as to be practically negligible. What we need now, and what we shall need in the future, with conditions which will increasingly accent that need, is the economical use of every thing we have. At no time will conservation of our resources be of greater importance.

This war has taught us many valuable lessons. Not the least of these is thrift. And thrift means conservation in everything we produce, the elimination of waste, and the continuance of our ability to supply the world with everything it needs. Waste, the antithesis of thrift, is the habit of the thoughtless and improvident. It would be mistaken policy on the part of this Government to continue contracts that pile up a vast debt and great accumulation of useless things.

Co-operation

Co-operation among all classes and nations there must be if we are to escape the absolute ruin of civilization. How this nation, wealthy beyond compare and strong to do many things, shall use its wealth and its strength to succor those who have borne the worst ravages of war is still a question, but there is no question at all that it is going to use them and for that purpose. Nor is there any doubt that we shall have the co-operation of other nations, so far as the war leaves them able to give it. There is visible nowhere in this country a disposition to take advantage of the weak and the oppressed.

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A Matter of Timeliness

THE *Journal of the American Institute of Architects* in its leading article in the November issue (received on December 4th) asks the question, "How soon will the Government allow private building to go ahead?"

May we, in answer to this question, direct the *Journal's* attention to the November 27th issue of THE AMERICAN ARCHITECT, in which it was announced that "all remaining restrictions on non-war construction were, by order of the War Industries Board issued on November 22, removed."

The timeliness of news service furnished by a weekly publication is again fully demonstrated.

The Chicago Improvement Scheme

THE Michigan Avenue improvement, illustrated in this issue, is a splendid example of what can be done when co-operation in its highest form moves toward the development of a civic problem. When this improvement is well on its way to fruition, Chicago will have for all time a thoroughfare which in artistic development and civic dignity will not be excelled.

In this country there has been prodigality in the expenditure of our architectural opportunities. Too long has the principle been followed that a man has a right to do as he pleases with his own. Every city in this country has had presented at one time or another an occasion to develop certain civic centers in a dignified and well-considered way. Inability to secure co-operation among property owners has resulted in the failure to conserve an architectural possibility, and the consequences have been that inartistic medleys of buildings have been grouped to form an eyesore in the most generally frequented localities of these cities. And, as a rule, these errors, or, what is more true, these failures of co-operation, have been found about city squares.

Times Square in New York presents a typical example and one that can be easily recalled by most readers. With the Times Building on the south, the Claridge, Mr. Platt's office building and the Hotel Astor, extending on each side northward, there was presented the nucleus of a motive which, if properly developed, would have created a splendid locality. Through lack of co-operation among owners, this opportunity was lost. Many similar lost opportunities could be cited.

When Chicago's Michigan Avenue development is completed, that city will be able to present to every other municipality a most striking object lesson as to what can be accomplished when a group of owners gives a group of competent architects a free rein in the development of their property. And in commenting on this, the high value of the co-operation of the city government and the endorsement of organizations banded together for civic betterment must not be lost sight of.

These features of rearrangement are often defeated by reason of the excessive cost that always attends projects which are in a sense "alterations" of sections that have long assumed what was considered permanent form. That a group of property owners should be willing to undertake so radical and costly an experiment, and that the city, through its voters, should also be willing to embark on a scheme purely æsthetic and very costly, is a sign of progressiveness on the part of Chicago, that could with much advantage be emulated by other cities.

A Criticism and a Comment

THE general public will never get the idea that architects have abandoned the effort to do anything worth while unless architects by their own acts lay the foundation for such an impression. It is seldom difficult to impress on an intelligent client the value of good architecture, provided the impression sought to be conveyed is that of careful, intelligent supervision of construction combined with good design. A pretty picture or a skillfully executed model, designed to impress the client with the artistic glory of the proposed buildings, is all well enough, provided the completed structure fulfills the promise of this tentative presentation. But

will it, if the architect turns over to someone interested in their sale the design or selection of the utilities of the building and to some minor member of his office force the details of supervision?

Are architects permitting themselves to be forced into the same position as the authors of moving picture scenarios, who seldom receive credit for their authorship? Has their failure to assert themselves as the authors of the design, and the directors of builders, submerged them as far as the public is concerned? Has not the custom of placarding the structure with the name of the builder and the names of the various firms that supply materials pushed the architect so far into the background that the public has completely lost sight of him? Has not the growing tendency to advertise everyone connected with a building but the architect led to the action concerning advertising that was taken at the recent convention of the Institute?

Mr. Swartwout, in his communication printed on another page in this issue, states that in his judgment the fault with the discussion as to the practice of architecture lies in the "misconception of what architecture really means."

What does it mean? Certainly not the mere making of plans. The most brilliant design, the most perfect set of drawings are but a promise. The fulfillment of that promise is surely of importance, and it is the failure to realize that fact that has caused revulsion of feeling toward the profession on the part of a portion of the public.

Consider the architecture of the Midde Ages. What type of man created all those wondrous structures? Was it a simple drawer of designs, or were they the work of men to whom not only the design but every mechanical part of their structures was an open book—men who labored on the work along with their helpers and whose only distinguishing mark was the color or cut of their apron or the hat they wore. Were they not in the truest sense master builders? Is it not true that the actual plans and details of these structures were so few as to be unimportant, and that the buildings grew, day by day, guided and corrected by the actual presence of the architect? Has modern architecture, except in rare instances, and those marked by the most exhaustive supervision on the part of their architects, ever created with all the multiplicity of plans and specifications anything greater than the structures we regard as medieval masterpieces?

For years writers on architectural subjects reproduced in their books the plans and elevations of famous works of architecture. All these reproductions of plans and elevations were set forth with the deadly accuracy of rectilinearity produced by the T-square. Professor Wm. H. Goodyear, in his research into architectural refinements, clearly demonstrated that in every classic example there were curvatures in plan, widening refinement and bends in elevation. These were the secrets of the artistic excellence of those structures, and the reason for their existence was that the architects, the master builders, ran their lines and set their foundations by personal supervision of the work. They built up their structures in the same way as the painter builds up his picture.

Mr. Swartwout falls into the same line of reasoning of other thoughtful, studious men who, through the scholastic atmosphere of their well-appointed libraries, view the world's work, but fail to visualize the world's workers. Mr. Swartwout is insistent that "in this hour of freedom, architecture must not be submerged in mere efficiency." But is it not equally to be desired that neither extravagance nor inefficiency be glorified? Art can also be efficient. It will not detract from the artistic value of a building to make it structurally safe and provide proper heating, lighting and sanitary equipment, or to guard against excessive cost to the owners.

The program for the restoration of devastated France as outlined by that Government meets Mr. Swartwout's approval, as it also does every other man who appreciates a well-considered program of a work of this magnitude. France undoubtedly will restore as far as can be done all the "atmosphere and artistic aspect of her country," but it is doubtful if in all this reverential attitude toward art that she will perpetuate the unsanitary and unhygienic features of the French villages. There will be the basic principles of good architectural art to which will be added the touch of practical, up-to-date surroundings that modern living conditions demand. Picturesqueness will not overbalance a careful consideration of proper sanitary conditions, and the once ever-present manure pile will doubtless be depressed into the concrete pit.

None of the articles or editorials that Mr. Swartwout criticizes seeks by any form of argument to displace the architect from his rightful place as an artist, but there is something more in the practice of architecture to-day—mark the word practice, for that is what we are discussing—than the purely artistic creation of a good design. If the architect of to-day is content to stop just there and not supervise the execution of his design to the last detail, taking responsibility for the final result, which after all is what really matters, can he take exception to being regarded by that matter-of-fact lot of people, the clients, as purely an artist, and nothing more?

Criticism and Comment

The Editors, THE AMERICAN ARCHITECT

I have had occasion often in the last half year to discuss the curious manifestations of the spirit of unrest which have appeared in the editorials and communications of your paper, and, to a lesser extent, in other architectural papers, even in the *Journal* of the American Institute of Architects itself; and although these discussions were with men of my own profession, holding widely divergent views on almost every subject, I found there was a very general unanimity of feeling that the efforts so far had been destructive instead of constructive, and that, unwittingly perhaps, an incalculable amount of harm was being done to the architectural profession. The articles were, for the most part, despondent in tone, dreary Jeremiads anent all things architectural. The architects, say these articles, have failed in this great crisis. Come, let us find the cause for it all, and if we can't find it, let us scrap the whole outfit and start all over again. It is because of the canons of ethics, says one; or the competition code, says another; it is because we don't advertise; it is because we are not engineers; it is because of the reactionary sentiment in the Institute; it is because we study too much; it is because we study too little; it is because of the pernicious influences of classicism; it is because we have not made architecture safe for democracy; it is any one of these causes or all of them, and we must reform quickly or abdicate. Ca ira! And up with the red flag! It is the day—the day of the proletariat and the Bolsheviki!

But is it the day? I, for one, do not believe it. If the practice of architecture needs reform, and in many cases I think it does, let us reform it. If we have practiced our profession for the few and not for the many, let us by all means take as much interest in housing and industrial developments as the medical men take in the clinics of the poor. If we have too slavishly followed the precedents of the past, let us try to make our architecture a more faithful echo of the construction behind it and more consonant with the spirit of modernity. Let us do all this and more, but in doing it, do not let us forget that we are architects—professional men.

And it seems to me that the main trouble with the articles I have read, and the main reason why they have done more harm than good, is the total misconception of what architecture really means and the consequent blindness to the obligations the architect owes to the public, to his profession and to himself. Apparently it is held that anyone who can produce a set of plans by means of which a building can be erected is an architect, and the man who can produce, or cause to be produced, these plans in the most efficient, economical and business-like manner is the best architect; that these are days of efficiency, and the public, our clients, demand efficiency; and that Art, so-called, was once well enough in its way, but is now to be relegated to the past. Look, they say, at what the Government has done with its cantonments and warehouses. No nonsense or frills about these buildings. That is the modern way, quantitative production. I wonder, do all these gentlemen believe what they write so glibly. Is it because it seems to be the fashion? Because it is in the air? Or is it because the gentlemen have always had these ideas and have never quite liked to express them before, and that in these stirring days the veneer tends to come off in architecture as well as in war?

To all holding these utilitarian views of architecture it is quite natural that the restraints imposed by the code of ethics of the Institute of Architects should be irksome. Why should a business man be bound by the conditions of the competition code? It is true that the primary object of this code was to put his neighbor architect on the same footing of equality as himself and to safeguard the interests of the owner, but why should that stand in his way if he can get the job for himself? If, by submitting a large colored perspective, he can beat out someone who has only presented a pencil sketch, is it not good business to have someone in his employ who can make large colored drawings in a hurry; and if, as we've all agreed, the design doesn't count anyway, what is the difference? It is a business proposition. Similarly, why not go into speculative building or other forms of architectural high finance? And as for advertising, why, every business man advertises. There conceivably might be times when the shopping client would be allured by attractive bargains in plans. Smith and Jones offer used plans at reduced rates. Slightly soiled blue prints at your own price. And the firm name emblazoned with all its degrees and honors could appear on the façades of our building between the street number and the name of the man who furnishes the plumbing fixtures.

If this is what these gentlemen understand by architecture, it is their undoubted privilege in this free country to hold these ideas, however much we

may regret them, but it is not their privilege to insist vociferously that these ideas be forced down the throats of the rest of the profession. Nor is it their privilege, by the widespread dissemination of these views, to poison the minds of the public and to shatter the ideals of architecture and of the beauty of it inherent in all mankind.

And it is particularly unfortunate that this time, above all others, should have been chosen to launch this—I can't say this crusade, I should rather say propaganda. We have passed, or, rather, Europe has passed through the most terrible four years of history. An autocracy which has stood for the submergence of all that is noble and all that is beautiful, and has glorified efficiency above all else, has suffered the most humiliating and complete debacle ever known. In this hour of freedom architecture must not be submerged in mere efficiency. The destruction of Rheims and the devastation of the cities of Belgium have been everywhere considered among the great crimes of the war. This feeling was aroused not by the fact that by their destruction they were rendered useless for the purposes for which they were built, but because of the loss to the world of notable works of art that could never be replaced. A new church could easily be built that would be as large as Rheims and would accommodate as many people. The acoustics would doubtless be better, and it would be comfortably heated and brilliantly lighted—but would it ever be done? Are the French proposing to restore these devastated villages with smug little three-rooms-and-bath houses, all in neat rows, exactly alike, or, perhaps, of five or six different types, of which the difference consists in the shifting of a gable or a door, and with a little civic center and a social hall? From the published sketches and documents I have seen it is apparent they are not. When they rebuild these villages they will do it lovingly and beautifully, and in the end, probably, efficiently, giving as much care to the re-creation of the character and beauty of the place as they will to the comfort and convenience of the inhabitants. The French, above all nations, have recognized that good architecture is a national asset, and that same feeling is beginning to be strongly in evidence in this country in the newspapers, in magazine articles, in lectures, in speeches, everywhere, in fact, but in the one place where, above all others, it ought to be found—in the architectural press. It is a strange commentary on the times that while the laymen are busily organizing to erect memorials that they demand shall be the finest architecturally that can be secured, the architects, or some of them, seem to be apologizing for their being architects at all, envying their brother professionals, the engineers; throwing all professional restraint to the winds and saying frantically to their clients, the public: "We have reformed; we are artists no longer; we are practical business men, and if you don't believe it look at our advertisements." What will that public, our clients, think of it all? How can they know that these loud outcries come from only a small portion of the architectural profession? Will they not accept what they think is the architects' own estimate of themselves, and be persuaded to abandon those high ideals of architectural beauty that they have so earnestly entertained?

Possibly I am attaching too much importance to these articles and to this movement, if it really is a movement and not an hysterical outburst of a few. There is always the consoling thought that most people buy architectural magazines for the pictures that are in them and not for the reading matter, but it is disturbing to think that some people may read these things and may be influenced by them, and that the progress of architecture in this country may receive a setback at the very time when there is every chance of a greater development.

One thing more. I have seen repeatedly the phrase: "The lesson we should learn from the war." And I have read at least a couple of dozen attempts to show just what that lesson really is. No one seemed to have exactly the same idea of it, but whatever it was it was strongly at variance with the lesson in architecture which every layman who has seen war pictures has learned for himself, and which every soldier who has gone overseas has learned at first hand. The layman and the soldier have seen beauty of architecture, and a new idea has been awakened in their minds. They have instinctively compared the crudeness of their own towns and cities with the beauties of France, and Belgium, and England, and have been filled with the hope that they may somehow, sometime and somewhere be able to transfer some of that beauty to their own country. Why should the architects, or a part of them, be the only ones who are blind? In trying to teach the lesson to others they have ignored the fact that they have not learned it yet for themselves. It is not a case of the blind leading the blind, but of blind attempting to lead those of clearer vision.

New York. EGERTON SWARTWOUT.

Post War Criticism

The Editors, THE AMERICAN ARCHITECT:

During the progress of the war it has been the part of duty, wisdom and patriotism for all loyal citizens of our country to steer away from criti-

PLATE 179

AIRPLANE VIEW LOOKING NORTH ON NORTH MICHIGAN AVENUE FROM CHICAGO RIVER

THE NORTH MICHIGAN AVENUE DEVELOPMENT, CHICAGO, ILL.

DRAWING BY VERNON HOWE BAILEY

PLATE 180 LOOKING SOUTH ON NORTH MICHIGAN AVENUE FROM CHICAGO AVENUE WATER TOWER

THE NORTH MICHIGAN AVENUE DEVELOPMENT, CHICAGO, ILL.

DRAWING BY VERNON HOWE BAILEY

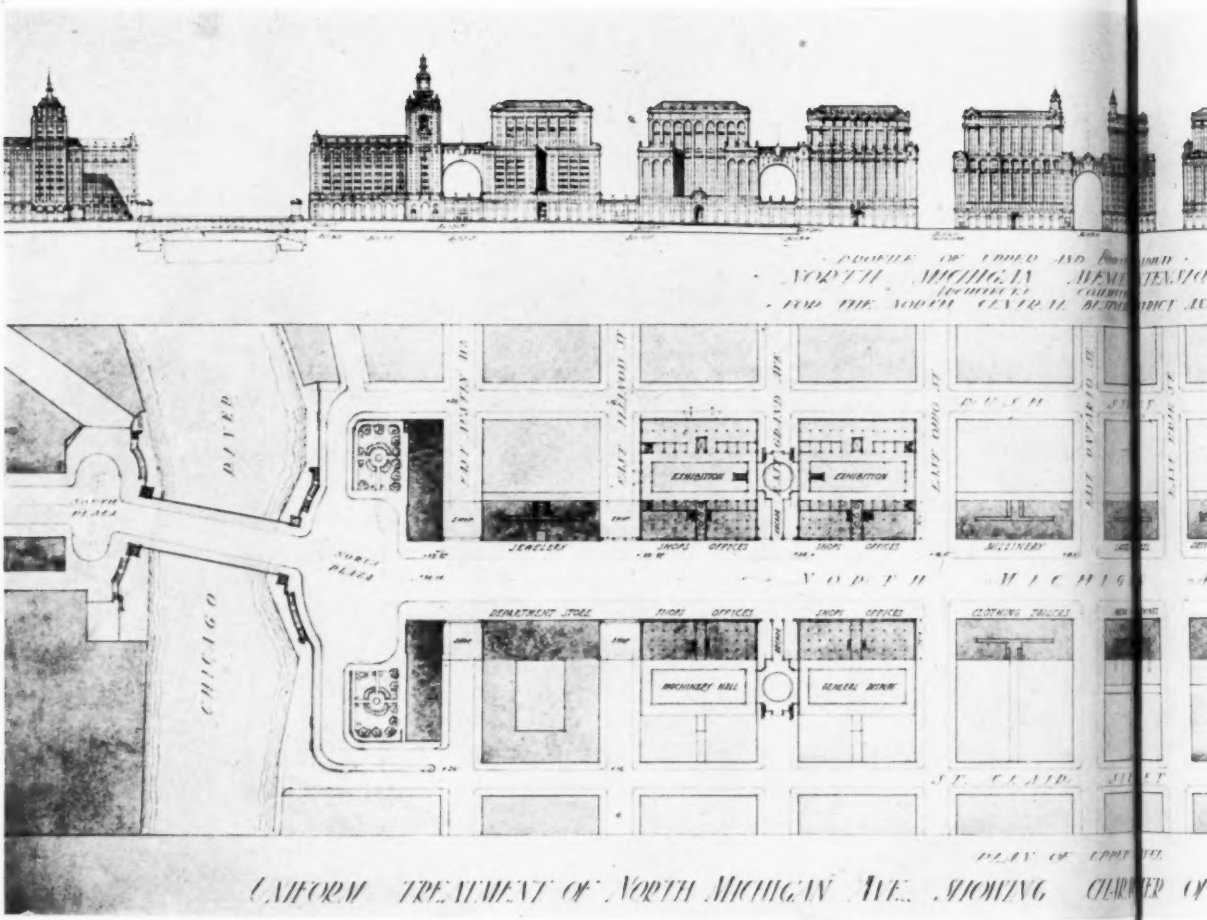
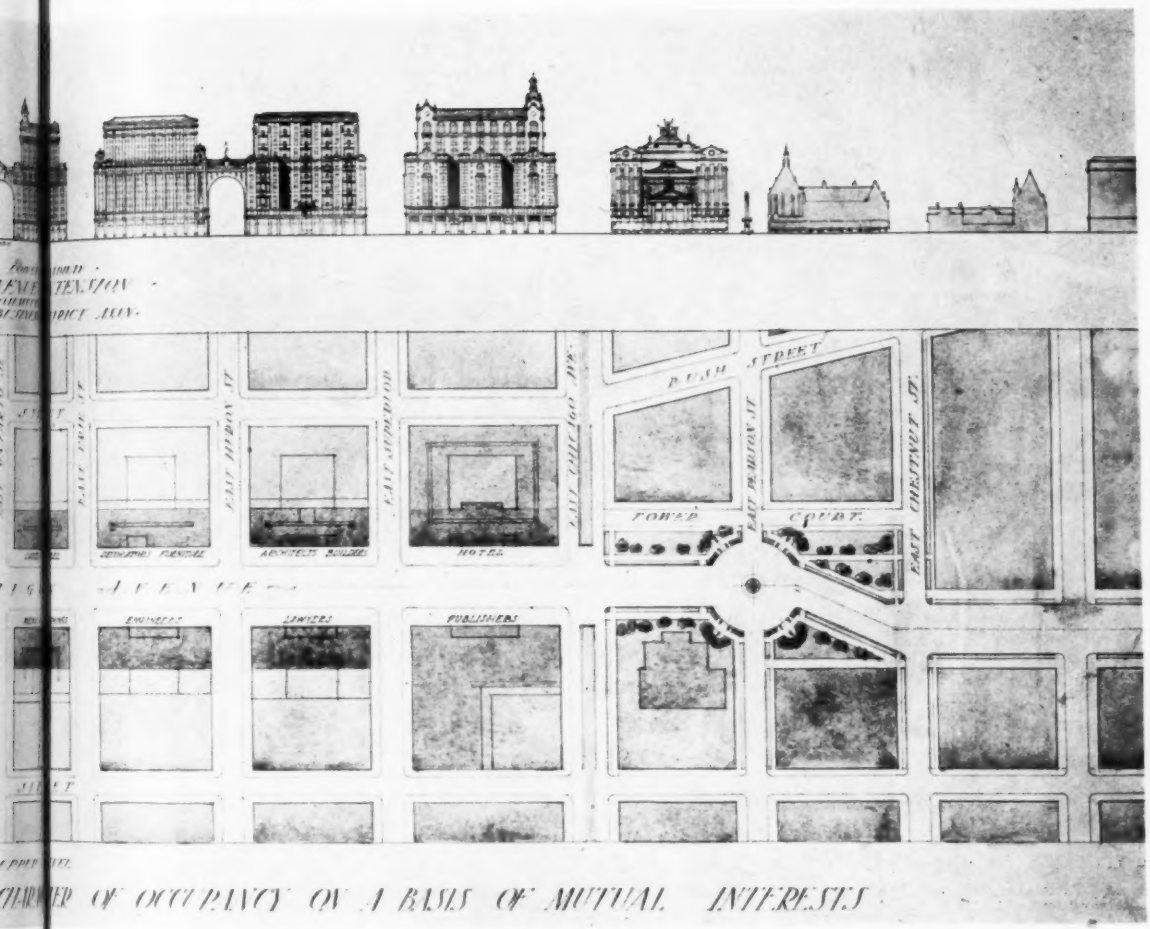


PLATE 185 UNIFORM TREATMENT OF NORTH MICHIGAN AVENUE, SHOWING CHARACTER OF OCCUPANCY A BASIS

THE NORTH MICHIGAN AVENUE DEVELO

DRAWING BY N. REBOR



PANCY ON A BASIS OF MUTUAL INTERESTS, WITH RAMPS FEEDING RUSH AND ST. CLAIR STREETS

ENUE DEVELOPMENT, CHICAGO, ILL.

NG BY A. N. REBORI

PLATE 181 LOOKING NORTH ON NORTH MICHIGAN AVENUE FROM HURON STREET

THE NORTH MICHIGAN AVENUE DEVELOPMENT, CHICAGO, ILL.

DRAWING BY VERNON HOWE BAILEY

PLATE 182

LOOKING SOUTH ON NORTH MICHIGAN AVENUE, SHOWING UNIFORM CONTINUOUS BALCONY WITH UNRESTRICTED BUILDING HEIGHT

THE NORTH MICHIGAN AVENUE DEVELOPMENT, CHICAGO, ILL.

DRAWING BY VERNON HOWE BAILEY

PLATE 183

LOOKING SOUTH ACROSS NORTH PLAZA, SHOWING LOCATION OF TOWERS IN RELATION TO CHICAGO RIVER

THE NORTH MICHIGAN AVENUE DEVELOPMENT, CHICAGO, ILL.

DRAWING BY VERNON HOWE BAILEY

PLATE 184 SOUTH PLAZA LOOKING SOUTH FROM BRIDGE

THE NORTH MICHIGAN AVENUE DEVELOPMENT, CHICAGO, ILL.

DRAWING BY A. N. REBORI

cism, argument or comment that would, in any way, interfere with or deter in the paramount thought of pressing the war to an early and victorious end. On account of the fact that the profession of architecture was neither consulted nor utilized to any extent by the Government in its immense war building program it has been of little importance during this time. The architectural press has taken this occasion to indulge freely in introspection, and many corrective contributions have come forth. Now that the closed lip has ceased to be the supreme virtue, perhaps some plain talk may be worthy patriotism, and I anticipate this will be forthcoming. Those who wished to criticise the profession have had a very fine field because counter-criticisms, to say the least, bore no prospect of doing good, and might have worked harm. It is different now.

The War Industries Board will have to make good the things that have been done derogatory to the profession of architecture if it expects the country to be satisfied. We made offers and efforts to help the Government, but were denied the privilege. Why? I shall not attempt to answer this here, but when I see the vast incompetence that has been exhibited in the building industries back of the war, I have no hesitancy in saying that criticisms of the profession are, by contrast, entirely out of order in this circumstance.

The profession of architecture is composed of men of education and broad learning, who have devoted their lives to building. They, by necessity, have every touch with building materials from the raw state to the finished product. They, for the same reason, have touch with men in all phases of building vocation. They administer over the products of the sixty or more industries tributary to building, as a daily duty, and are therefore in intimate touch, and most conversant with their use. Yet, when that profession tries to help in a time of need of its qualifications it is not permitted to do so, except in subordinate places where its advices are not looked for. If architects had been placed even as construction quartermasters where they were sorely and evidently needed, much expense and incompetence could have been avoided, and certainly proper functioning of the building work would have been realized.

If the architects of the United States had been taken into confidential relations with the War Industries Board and kept conversant with the nation's needs and the wishes of this functionary of building matters, whether utilized or not, they could have rendered most valuable aid in discontinuing private building and transforming building agencies into war work in a natural and direct way. Instead, they were not remotely informed in such matters, but were forced out of business by the indirect, enervating and expensive process of attrition, which incurred widespread dissatisfaction. Plain dealings would have served quicker and better, with satisfaction to all, and would have at the same time resulted in patriotic enlistment. Along with the architects thus sidetracked, the vast number of gifted contractors and builders were made loafers without the slightest suggestion as to how they might use their abilities to help, and yet were expected to hold their counsels, buy bonds and be patriots. Back of such a condition can only be one of two things, either rank incompetence or bad motive. The truth will soon enough assert itself in such matters.

The thing needed now is clear vision as we look ahead to the duties and opportunities before us. Very little retrospection and quibbling will suffice. The immensities that have been thrown around us for the last eighteen months are apt to dull the sense of simplicity. The return to normal life is only the return to normal, natural things and the reordering of things disordered, and is a simple matter. Let the architects get back to their desks, the builders recuperate and re-establish their organizations and get ready to do business in the good old way. Lots of dazzle and pyrotechnics will have to be turned loose to set in motion a new era, but when its noise is hushed and the smoke has cleared away the simple contract system and the drawings and specifications of architects will be the vogue. This is the democratic way. By it the many are given opportunity. Price fixing and percentage building belong to monopolists and paternalists and favors the few. Bet the game and stay with it and prices will stabilize, men will develop in their right places and efficient progress and contentment will, as ever, be the result.

It is surprising indeed that the existent methods employed in building should have been disordered at a time when the necessity to get production and to conserve man-power was never so paramount. As it happened, the numberless building organizations existing at the time the Government launched its building program were broken and scattered. Confusion naturally followed. A monopoly system was set up in place necessitating reorganization and without trained leadership. There came consequent waste in time, materials and man-power, the loss in which is incalculable and the perils of which are before us now as we undertake the return to normal life and attempt readjustment. Under an architectural leadership the building and other attendant organizations would have been held intact and placed in units where and when needed, and an

even tenor in process would have obtained. The best efficiency would have been the result.

As an internal economic proposition the necessity for an architectural administrator of building antedated the necessity for a food administrator and for a coal administrator. With a trained building administrator at the helm many farmers and miners would have been left in their places to produce more food and more coal instead of laying down their rightful implements of industry to join the "hatchet and saw brigade."

It was just as reasonable to anticipate that the armies in the field of war could accomplish their task without leadership trained in the arts and management of war and not entail loss in materials, time, money and man-power, as it was to anticipate that the armies in the field of building could accomplish their task without leadership trained in the arts and management of building and not entail loss in materials, time, money and man-power. Indeed, architects acting as military officers over our armies in France would be no less ridiculous than army officers acting as architectural directors of building at home. This would be very apparent if the risk to human life were the same in both instances. The economic question is just the same, and no doubt many a life is lost in war as a result of misapplied service in industry back of war. Building enterprise and army services are two separate and distinct national functions, and where one touches upon the other in the affairs of the nation it is clearly the Government's duty to administer so that each occupies and conducts the activities of his respective realm if efficiency is the object. The present administration should even now see the error of the existing misplacement in the realm of building and correct it for the building it intends to carry on to completion. If it does, more propitious will be the nation's affairs during the conduct of the remaining work to be done and more felicitous will be our return to normal life.

While thus much has been said addressed to the exigencies of the present moment in the nation's affairs, it might be added that conflict visualizes the things that should be of common practice, and it is to be hoped that our Government can now see the need for a department of building. Such a department is no less important than the Department of Agriculture. The industry of building is excelled in the number of population employed and amount of wealth involved only by agriculture, and is therefore of great economic importance. This industry involves the housing, health and happiness of the people at home, at school and at their labor, and is of constitutional importance. This industry involves that intangible, inscrutable something that we call art, that moves the emotions and stimulates sentiment and is of spiritual importance. Indeed, this industry involves all the artificial handling of materials in their shaping for the external environment of mankind, and is of supreme psychological importance. If a man is judged by the architecture of his home, and a city is judged by its architecture, then equally is a nation so judged. It follows that architecture is of unquestioned national importance.

W. A. EDWARDS.

Atlanta, Ga.

Improving Farm Buildings

The Editors, THE AMERICAN ARCHITECT:

I have read with interest the editorial in which you quicken the minds of the American people upon the importance of having proper farm homes and farm buildings for our agricultural population.

It may interest you to know that in this Commonwealth through our Department of Agriculture we have endeavored to accomplish something in this matter and at the next session of the Legislature I hope to see created a bureau which will have for its function the matter of caring for the farm property in Pennsylvania, a bureau that without cost will furnish counsel to any farmer desiring to locate new farm buildings upon his property.

Three things will be kept in mind in advising farmers:

1—The sanitary conditions, to the end that wholesome and potable water, uncontaminated, may be guaranteed to the farmer and his family;

2—The reduction to a minimum of the amount of travel necessary from one farm building to another, to the end that there may be no lost effort in accomplishing the work incident to farm life.

3—The artistic setting of the buildings, having in mind the economic as well as the æsthetic meaning of such a setting and particularly the value of such a setting should the property be put up for sale in the public market.

It is intended to have lantern slides prepared, showing both proper and improper location of buildings, proper and improper artistic treatment of buildings or the absence of such treatment. We shall assemble the farmers in small groups in the several communities of the Commonwealth and explain all this to them in a plain, direct, practical manner.

I thought you might be interested in knowing of this plan, which seems to have some merit in it.

H. W. BRUMBAUGH,
Governor, State of Pennsylvania.

Harrisburg, Pa.

To Put Surrender on Canvas

SIR JOHN LAVERY, ENGLISH ARTIST, TO PAINT HISTORIC SCENES

The historic scene in Admiral Sir David Beatty's cabin on the Queen Elizabeth when the German delegates arranged for the surrender of the German fleet is to be placed on canvas by Sir John Lavery of the Royal Academy.

The artist made a special visit to the Grand Fleet at the request of the British Admiralty to make the preliminary sketches for the painting. He was present in the Admiral's cabin during the whole of the conference and painted a finished study of the scene which will serve as a basis for the canvas which he hopes to complete in the next few months.

The New Education

A great revolution in education seems imminent, states *Guaranty News*. Millions of men organized into fighting machines have required the services in the field and at home of other millions who were trained to do certain things and whose exact knowledge of matters pertaining to those tasks has been essential to military efficiency. Similarly, in the face of a shortage in man-power, in the equipment for carrying on normal activities, in time itself, a greater efficiency in producing and distributing and using the goods and services required for ordinary living has become necessary. There has been on both the military and civilian pages of our economic register a demand for men and women who could do something that was worth while doing, or who, if they had no special training, had sufficient general knowledge and intelligence to make further training possible. The supply has been something far different. Through the disruption of their working forces and the absence of a free labor-market employers have come to realize how scarce are men and women who have either special training or general knowledge.

Now it is not such a significant thing that this is the fact as it is that an increasingly large number of people in every country are beginning to be startled by it. As a result we see the need of education being emphasized in the plans of every country which is making ready for peace. The war has directed attention to this situation. The problems to be solved in restoring peace and preserving it are driving the lesson home. Therefore the periods of compulsory attendance at school are being lengthened. Extension courses are being multiplied. Research divisions are being established in all large concerns for the ambitious student. It is planned to give elementary instruction in ways that will encourage rather than repel. Those already in employment are to receive opportunity to study under circumstances which make real study possible.

When France Rebuilds

"Have you Americans any conception of what the requirements of France will be when the Allies have won the war and our country begins its work of reconstruction?" This question was asked me a few days ago by a prominent business man of Paris, who, having been gassed, can no longer fight, and is visiting in this country, says H. H. Windsor in an exchange. From what he proceeded to relate it is evident that comparatively few on this side do realize what our export trade to France is destined to become.

"For many years," he said, "our people secured their machinery, printing presses, tools, electric machinery and lighting fixtures, etc., all from Germany. This was because German prices were lower than other countries. But now! Germany could not name a price which would induce a Frenchman to buy of her, no matter what his need. England will be busy supplying her own wants and those of her export trade, hence we are looking to your country. Our textile mills, nearly all of which were in northeast France, have long since been destroyed and the machinery carried into Germany. Our textile manufacturers are already making a new start in southwest France, securing what little machinery they can. With the end of the war this industry will be one of the first to resume, and we shall require, of textile machinery alone, over 200,000,000 francs. I could go on down a list of a hundred articles whose requirements, while not so great, will in the aggregate total a vast sum. Partly because our people regard the Americans so highly and are full of admiration for the splendid things they are doing in our country, and partly that we may know and read your language great numbers of our people are studying English, not only to be able to read it, but to speak it as well. We expect to offer such attractive opportunities, especially to constructive engineers and mechanics of all kinds, that thousands of your young men will remain in France, at least during the first two or three years of reconstruction."

Personal

R. Brognard Okie, architect, announces that he has severed his connection with the firm of Duhring, Okie & Ziegler of Philadelphia, Pa., and has opened offices in the Crozer Building, 1420 Chestnut Street, Philadelphia.

Provides for a Statue of Foch

A resolution authorizing the erection of a statue in Washington of Marshal Foch, and appropriating $100,000 for the purpose, has been introduced in the House by Representative Sinnott of Oregon.

A National Program of Road Construction

The United States Highways council, in co-operation with the Bureau of Public Roads of the Department of Agriculture and the state highway departments, is soon to begin preparation of a program of road and street construction, reconstruction and maintenance throughout the United States for the working season of 1919.

The purpose is to approximate the character and amount of work deemed essential for 1919, with the amount and character of financing and materials involved, and the probable demand on rail and water transportation and labor supply. The preparation of the program in each state is to be in charge of the state highway department.

The council is composed of representatives from the Department of Agriculture, the War Department, the Railroad Administration, the War Industries Board and the Fuel Administration. Logan Waller Page, director of the Bureau of Public Roads, is chairman.

Color—Small Quantities

The use of mineral pigments for color in manufactured stone is at times desirable, but in such quantities as not seriously to affect the strength of the product. Beyond that the use of color is a matter of taste or good sense.

Strong colors in large quantities over large areas are usually offensive, and in any event are usually unsuited to the best expression of the material.

It is interesting to see some of the brilliant colors which it is possible to obtain, to know they can be resorted to in special cases for small objects. Further than that, examples of such highly colored concrete are like the cow sculptured in butter at the county fair—industry gone wrong.

The walls of a house or other building must be lived with a long time. Color must be carefully considered, modestly used. It must be mellow, not glaring, when applied in large quantities.

Manufacturers of concrete stone who are selling to discriminating clients soon learn to be grudging with mineral pigments, to strive for soft, mellow tones, mere suggestions of color, sometimes barely escaping whiteness, slightly softening the whiteness produced with light aggregates and white cement. One such manufacturer puts the limit of 35 pounds of color to 25 cubic feet of stone, and that means approximately 35 pounds of color to 600 pounds of cement or about 1 to 17. Most of the color so used is yellow ochre. Many different effects are produced with the same colors, and only a few aggregates, by different blendings. Chief reliance, at all events, should be on the aggregate.—*Concrete.*

Fuel Conservation in England

The *British Board of Trade Journal*, a government publication, has just announced that 400 experts have been appointed by the coal controller to consult with and advise steam-power users how to eliminate waste. As the result of an inquiry by the Coal Control Technical Department it is clear that tremendous wastage of coal is going on which could be prevented. It will, however, take several years to recover the whole of this loss, even if a supreme effort is made by all the industrial firms, as it is impossible to install more efficient plants under present conditions. Another cause of wastage of coal is the employment of unskilled stokers, and unfortunately there are to-day perhaps more men of this description than at any other time, as so many skilled stokers have joined the army.

There are 45,000 users of steam plants in Great Britain. Up to the present, reports on 364 firms have been carefully scrutinized, and it is estimated that a saving of approximately 106,000 tons will result. This saving can be effected without any serious alterations to plant by obtaining greater efficiency in the combustion of fuel and by education of stokers.—*Domestic Engineering.*

"Back to the Soil" Movement in France

The "back to the soil" movement occupies a prominent place in the reconstruction plans for France, and in order to encourage it the Conseil General of the Loire Department has voted 600,000 francs to be issued for the purpose of furthering agricultural enterprises and hastening the repopulation of the farming districts.

The aim of the resolution of the Conseil General is to interest young farmers in this scheme and to induce those who have heretofore hesitated for want of financial assistance to return to the soil. Their reasons for deserting the farms for the mills and factories of the cities will no longer have the same force. They will be given every encourage-

ment to stick to the soil, which sorely needs their skill and labor, and thus, by their efforts, they may be able to contribute to the restoration of their native country.

To Resume Public Building

Resumption of construction work on post office and other public buildings has been ordered by Secretary McAdoo, thereby rescinding orders of last December suspending all public building on account of war conditions.

"The changed conditions," said Secretary McAdoo, "brought about by the conclusion of the armistice and the manifest inability of Germany to renew the conflict emphasize the importance of resuming with as little delay as possible the normal industrial activities of peace."

This policy is considered as affecting the attitude of the Capital Issues Committee, which is affiliated with the Treasury, in passing on proposed issues of securities to finance building operations, frowned upon heretofore on account of scarcity of labor and materials. In this connection, Secretary McAdoo said:

"The resumption of construction work by the Government will contribute toward facilitating the industrial transition of the country from a war to a peace basis and should serve to encourage others to undertake without delay the fulfillment of the many and varied industrial peace needs of the country."

For Uniform Light Saving

John Anderson, a member of the Legislative Council of Newfoundland, who has been called the father of the one-hour daylight saving plan, said, on a recent visit to the United States, that the time had come for the authorities of Great Britain, Canada, and the United States to come to some agreement for uniformity in changing the clock in the Spring and Fall.

"There is already uniformity between Canada and the United States, and the next step is uniformity with England," said Mr. Anderson. "There should be no difficulty in arranging a uniform time for altering the clock time between England and America, for it would be a decided convenience to shipping and many other interests in providing a uniform time schedule throughout the year."

Mr. Anderson gives the credit for the daylight-saving plan to William Willett, an English architect, who died two years ago and who began his campaign to aid the workingman in saving an hour of daylight for labor in 1907.

"Looking at the daylight-saving measure from an economic standpoint, and that is a great factor, I believe it would be a conservative statement to say that the saving in the British Isles, the United States and Canada during the last six months has been fully $170,000,000," said Mr. Anderson. "That only allows a saving in lighting and fuel expense of $1 a person, as I am estimating a population of 110,000,000 for this country, 50,000,000 for Great Britain and 8,000,000 for Canada and Newfoundland."

Fewer Workers Injured

INDUSTRIAL BOARD POINTS OUT BENEFITS OF COMPENSATION LAW

A report by the Bureau of Compensation of the New York State Industrial Commission says that since employers have had to pay for accidents to their employees the number of accidents in industrial plants has greatly decreased, the average of the last year being a little less than one in each plant. This is explained by the fact that employers are now more careful to safeguard their employees against accidents, and that men and women are not now set to work at machines until they have been fully instructed in the use of them.

Electricity on the Farm

It is apparent from the fact that 200,000 hp. in electric motors is now actually being used on the farm, that the phrase "Electricity on the Farm" does not any longer constitute an idle dream, remarks the *General Electric Review*. Although 160,000 hp. of this is used for irrigation and reclamation purposes, an object peculiar to semi-arid sections, the remainder, or 40,000 hp., is actually being used for miscellaneous farm purposes, such as driving the cream separator, butter churn, and so on. The only thing that we are not doing with electricity on any scale is plowing and cultivating, and this now bids fair to be a commercial reality in the very near future.

Plan Soldiers' Monument

PROPOSAL TO ERECT MEMORIAL NEAR THE STATUE OF LIBERTY

A suggestion for the building of a war monument in New York Bay near the Statue of Liberty to the New York City soldiers who lost their lives in the war was discussed at a meeting of the directors of the Army and Navy Service Station of the

Young Men's Democratic League. It was proposed to have the military memorial face the statue, and a committee was appointed to start a movement for its erection.

Frank D. Shelley, president of the League, has applied to the War and Navy Departments for complete lists of names of men from this city who have perished in the war. As a further honor to soldiers and sailors the League will petition to have the name of Battery Park changed to "Heroes' Park."

France Acts to Aid Labor

Louis Loucheur, French Minister of Munitions, has presented an important and interesting report regarding the transformation of the present war factories.

Measures have already been taken, the Minister said, to prevent idleness as far as possible, and to insure work to French workmen and women before foreign laborers and prisoners get employment.

The production of war material would cease progressively after military requirements, and the available workers were taken into account, the Minister said.

The Parliamentary Committee for Food Supplies has approved the Government bill authorizing a Treasury advance up to $10,000,000 to provincial and communal bodies for organizing and working popular restaurants and kitchens.

A Traveling Exhibition of American Industrial Art

An exhibition of American industrial art has been assembled by the Art Alliance of America, and will be circulated by the American Federation of Arts. The purpose of this exhibition is to stimulate an interest in American-made goods. Behind this very laudable purpose is that of the Art Alliance to establish a museum of industrial art. This should receive the support of architects in this country, as in the highest development of American craftsmanship the architect's *alter ego* will find its most valuable development.

It is to be hoped that architects in the various cities where this exhibition is shown will take sufficient interest to visit it and communicate with the Art Alliance of America, 10 East Forty-seventh Street, New York, offering constructive criticism for developing this valuable form of exhibition.

English Channel Tunnel Project Revived

One of the enterprises which will be taken up and carried to completion after the war will be a tunnel under the English Channel. Sir Arthur Fell, chairman of the House of Commons Channel Tunnel Committee, speaking at a recent meeting in London, explained the importance of such a railway between England and France. He thought it would be practicable for the line to run from London to Constantinople without break or change of cars. Eventually, he said, when normal conditions are restored, the line might be extended from London to Calcutta, to Capetown and Peking.

Window Shades Held Great Aid in Fuel Conservation

Prof. John R. Allen, dean of the Engineering School of the University of Minnesota, and former president of the American Society of Heating and Ventilating Engineers, has announced the results of an experiment just completed proving that window shades carefully adjusted will save from 20 to 40 per cent of the heat in a room. The experiment was conducted at the request of the Fuel Administration. "The air space," says Professor Allen, "between the window pane and the shade serves as a barrier to the cold. Double shades are found to be twice as effective."

A campaign for spreading these facts before the public is under consideration by the Fuel Administration.

Department of Architectural Engineering

Effect of Time of Mixing on the Strength of Concrete

By PROF. DUFF A. ABRAMS
Structural Materials Research Laboratory, Lewis Institute, Chicago

Part I

[Eighteen to twenty years ago the use of reinforced concrete began to be considered in this country. There was no English literature of any importance on the subject and it was necessary to resort to the use of German and French publications. The importance of this type of construction was given instant recognition and the matter was attacked with the usual American energy. The first efforts were to secure some kind of a formula and a revolving machine in which to mix the concrete, then the contractor-engineer was on the job and we began to experiment in actual construction.

Engineering schools and laboratories investigated the theory of the design, resulting in standardizing formulas and methods of reinforcing. There is still work to do along these lines in the way of refining the analysis of the stresses and designing the steel work for economy. It is proper to say, however, that safe construction in reinforced concrete is accomplished and economy of construction, as influenced by the design, forms and construction equipment is receiving the greatest attention at this time.

During the development of the factors just mentioned but very little attention was given to *concrete itself*. A few years ago some microscopic investigations were made which created great interest and demonstrated that the subject of the cement, aggregate and methods of mixing were of as vital importance as the analysis of the stresses and the design.

The investigations under way for some time at the Structural Materials Research Laboratory, Lewis Institute, Chicago, are a portion of a very comprehensive program conducted by Prof. Duff A. Abrams, in charge. The paper here given was prepared by Professor Abrams to make public, before the American Concrete Institute in 1918, some of the accomplished results. The paper has not been published by the Institute as yet. The original paper has been revised to some extent to be more adapted to the use of the architect and is here printed in that form.

A careful reading will disclose the convincing evidence of the great importance of Professor Abrams' work and will cause an anticipation of interest in the work yet to be accomplished. After these tests are all completed and analyzed, it will then be possible to write a *correct* specification for the proportioning, mixing and curing of concrete.]

MACHINE-MIXING has almost entirely replaced hand-mixing of concrete on work requiring the use of large quantities of material. While it is generally recognized that good concrete can be secured by hand-mixing, it is also well known that this result can be accomplished only at the cost of conscientious effort and much hard work. It has long been known that the thoroughness of mixing, whether by machine or hand, has an important influence on the quality of the finished concrete. Reference may be found in engineering literature to several series of tests in which the effect of duration of mixing was studied. So far as hand-mixing is concerned, such studies have been generally confined to briquet tests made on cement mortars. The tests on machine-mixed concrete which have been reported covered such a narrow range that no quantitative measure of the effect of continued mixing has been developed. No sustained effort has been made, so far as the writer is aware, to analyze the factors which enter into the beneficial effects of continued mixing. Due to a more or less vague impression of the value of longer mixing time, there has been a marked tendency during the past year or two on the part of specification writers toward lengthening the time the batch should remain in the mixer.

There can be no question of the importance of thorough mixing of concrete. Undoubtedly much inferior concrete is produced by undermixing. Undermixing, coupled with the excess of mixing water, which is too frequently used, forms a combination which is very conducive to defective concrete or concrete of low strength and wearing resistance. Of the two evils, excess water is by far the greater.

Due to the multiplicity of sizes and designs of batch mixers, the exact basis for the mixing period has not been clear. Should a minimum time limit be specified? Or should a minimum number of revolutions of the drum be required? If a minimum time limit for mixing is specified, what is a proper basis for mixers of different capacities, or mixers operating at different rates? Whatever basis is used for fixing the minimum amount of mixing which would be acceptable, several other questions of equal importance are immediately

raised. What is the effect of the time of mixing if the proportions of the concrete are changed? The change of proportions would involve varying the relative quantities of cement, water and aggregate, the size and grading of the aggregates, etc.

It was with a view to securing definite information on some of these problems that the tests covered in this report were carried out. Two forms of test were used:

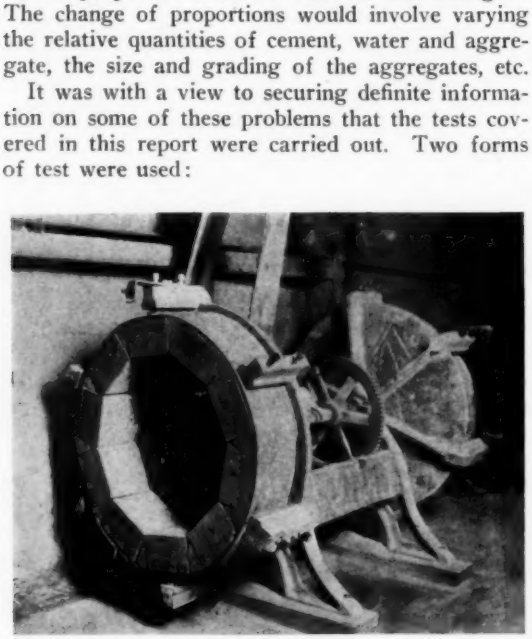


FIG. 1—TALBOT-JONES RATTLER WITH CONCRETE WEAR BLOCKS IN PLACE

Wear tests were made on blocks 8-in. square, 5-in. thick.

(1) Compression tests of 6 by 12-in. concrete cylinders.

(2) Wear tests of concrete blocks 8 in. square and 5 in. in thickness.

The wearing resistance of concrete is of great interest in view of the widespread use of concrete for the construction of roads, pavements, floors, walks, etc. The wear tests were made in the Talbot-Jones rattler.

Over 3,800 specimens were made in the experiments covered in this report. The 1-year compression tests are not yet due. For the conditions of the tests, definite results were secured on the following topics:

(1) Influence of quantity of mixing water on the strength and wear.

(2) Effect of time of mixing (15 sec. to 10 min.) on the compressive strength of

(*a*) Concrete of different consistencies.

(*b*) Concrete of different cement content.

(*c*) Concrete made of aggregates of widely different size and grading.

(3) Effect of time of mixing on the wear of concrete of different consistencies.

(4) Relation between wear and compressive strength.

(5) Effect of rate of rotation of mixer drum on the strength of concrete.

(6) Effect of temperature of mixing water on the strength of concrete.

(7) Effect of age on the strength of concrete for

(*a*) Different times of mixing.

(*b*) Different mixes and consistencies.

(*c*) Different sizes of aggregate.

(8) Comparison of machine-mixing with the method of hand-mixing used in the laboratory.

(9) Uniformity of mixer tests.

These experiments form a part of the researches in the properties of concrete and concrete materials being carried out at the Structural Materials Research Laboratory, located at Lewis Institute, Chicago. The tests must be considered as preliminary to any comprehensive investigation of the performance of concrete mixers. Such an investigation would include machines of many types and capacities and numerous other factors which have not been studied. It is hoped that an opportunity will be found for extending these mixer investigations beyond their present limits.

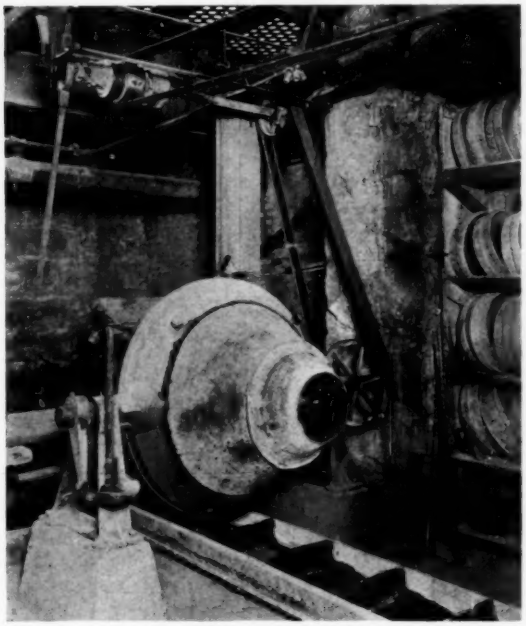


FIG. 2—3½-CU. FT. CONCRETE MIXER USED IN TESTS

The trough shown in the foreground was used to receive the concrete as the batch was discharged.

Outline of Tests

For convenience, each group of experiments is given a series number. It is believed that con-

fusion will be avoided by referring to the tests by the series numbers. Table 1 gives the titles of the series and the number of tests of each kind.

The tests on effect of time of mixing covered in this article were made on concrete mixed in a tilting mixer with a double-cone drum, capacity 3½ cu. ft. In all tests the mixer was loaded to capacity and the entire batch was made into test pieces.

TABLE 1—OUTLINE OF TEST SERIES.

Series No.	Title	Total Number of Tests		
		Compression	Wear.	Miscellaneous
81	Uniformity of Machine-Mixed Concrete	44	...	70
89	A Study of the Time of Mixing Concrete (Effect of Consistency)	612	...	70
93	A Study of the Time of Mixing Concrete (Effect of Mix and Size of Aggregate)	1,344	240	82
96	Study of Rate of Rotation of Mixer Drum	576	...	70
97	Effect of Temperature of Mixing Water on the Strength of Concrete	660	...	70
	Total	3,236	240	362

Series 81 was preliminary in nature, carried out for the purpose of studying the variation in the compressive strength of specimens made from different parts of the same batch of machine-mixed concrete. Three batches of different consistencies were mixed. Compression tests on 6 by 12-in. cylinders were made at 7 and 28 days.

Series 89 included a study of the effect of time of mixing, using concretes of consistencies varying from a fairly stiff to a wet mix, the proportion of cement and the grading of aggregates being the same in all tests. Batches of each consistency were mixed for periods ranging from 15 seconds to 10 minutes. Compression tests were made at ages of 7 and 28 days and 2 months, and wear tests at 2 months. This is the only series in which wear tests were made.

In series 93 a study was made of the effect of time of mixing, varying both the mix and the size of aggregate. The first part of the series consisted of variations in the quantity of cement from a 1-15 to a 1-2 mix, using aggregates of the same grading (0-1¼ in.). In the second part of the series a 1-5 mix was used, the aggregate ranging in size from sand all of which passed the 14-mesh sieve to a sand and pebble mixture graded up to 2 in. Batches of each mix, etc., were mixed for periods of 15 seconds to 10 minutes. Parallel sets of tests on hand-mixed concrete were made for comparison with the machine-mixed specimens in both of the groups mentioned above. In the hand-mixed concrete only one mixing period was used. Compression tests were made at ages of 7 and 28 days and 3 months. The 1-year tests are not yet due.

Series 96, "Effect of Rate of Rotation of Mixer Drum," concrete of 1-5 mix, aggregate graded to 1¼ in. in size was mixed for 1 minute at six different rates, ranging from 8 to 30 r.p.m. The rate recommended by the manufacturers for this mixer is 18 r.p.m. Concrete of four different consistencies was used for each rate. Compression tests were made at ages of 7 and 28 days and 3 months. The 1-year tests are not yet due.

Series 97, on effect of temperature of mixing water on the strength of concrete, is somewhat foreign to the subject-matter of this article, but since the tests were made at the same time, using the same materials and under similar conditions, it is considered desirable to include the results here.

The temperature of the mixing water was varied at intervals of 18 deg. F. from 32 deg. to 212 deg. F. Four different consistencies were used. Duplicate batches were mixed for each condition on different days. Compression tests were made at ages of 7 and 28 days and 3 months.

MATERIALS

The cement used consisted of a mixture of equal parts of four brands purchased in the Chicago market. The brands were thoroughly mixed by placing one sack of each in the mixer and running for about one minute. All cements complied with the standard specification of the American Society for Testing Materials, Jan. 1, 1917.

The aggregates consisted of sand and pebbles from Elgin, Ill. This material was received in carload lots in the form of coarse "torpedo" sand, graded up to ⅜ in. in diameter, and pebbles graded from ¼ to 1¼ in. Before using, the sand was screened through a No. 4 sieve. All material retained on this sieve was added to the pebbles. The pebbles were all from the same shipment. The material was shoveled over several times and stored for use in a shallow bin. In most of the tests the aggregate was graded up to 1¼ in. by mixing a certain percentage of sand with the pebbles. In Series 93 the aggregates of the smaller sizes were prepared by using the sand finer than No. 14, No. 8 and No. 4 sieves, respectively.

The sieves used in all of these tests were what are known as the Tyler standard sieves. The dimensions of the sieves used are given in Table 2. Table 3 gives the grading and other properties of the aggregates. The sieve analyses are the average from samples taken at intervals throughout the period covered by the tests.

TABLE 2—SIZES OF SIEVES USED IN SIEVE ANALYSES OF AGGREGATES

Brass wire cloth sieves with square openings.

Sieve No. or Size	Size of Clear Opening in.	Size of Clear Opening mm.	Diameter of Wire in.
100	.0058	.147	.0042
48	.0116	.295	.0092
28	.023	.59	.0125
14	.046	1.18	.025
8	.093	2.36	.032
4	.185	4.70	.065
⅜ in.	.37	9.40	.092
¾ in.	.74	18.8	.135
1½ in.	1.5	38.0	....

The weight per cubic foot of the aggregate was determined by means of machined cast-iron measures, having capacities of 1/5 and ½ cu. ft. The ½ cu. ft. measure was used for the larger sizes; the 1/5 for the smaller sizes. The inside diameter of each measure is equal to the depth. The test was made by filling the measure about one-third full and puddling with a small steel bar pointed at the lower end. Filling and puddling was continued in like manner till the measure was full. After striking off with a straight-edge, the weight was determined.

TABLE 3—NOTES ON AGGREGATES

All aggregates consisted of sand and pebbles from Elgin, Ill.

Ref. No. in Series	Range in Size	Amount Finer than Each Sieve Per Cent. by Weight 100	40	28	14	8	4	⅜	¾	1¼	2	Weight lb. per cu. ft.	Density	Voids
						SERIES 81								
All	0-1¼ in.	0	2	11	18	28	40	50	80	100		130	.781	.219
						SERIES 89								
All	0-1¼ in.	0	3	11	16	21	44	50	82	100		130	.781	.219
						SERIES 93								
49-54, 249	0-14	2	11	58	100	...	...	...	...	...	...	104	.626	.376
55-60, 255	0- 8	1	8	42	72	100	...	...	...	...	...	110	.660	.340
61-66, 261	0- 4	1	6	30	52	72	100	...	...	...	...	115	.691	.309
67-72, 267	0- ⅜ in.	1	5	23	40	56	77	100	...	...	...	124	.746	.254
73-78, 273	0- ¾ in.	0	4	21	25	35	49	69	100	...	...	126	.756	.244
1-48, 201, 243	0-1¼ in.	0	2	10	18	24	34	51	84	100	...	130	.781	.219
79-84, 279	0-2 in.	0	1	6	10	14	20	40	60	80	100	128	.770	.230
						SERIES 96								
All	0-1¼ in.	0	2	10	18	24	34	51	84	100	...	130	.781	.219
						SERIES 97								
All	0-1¼ in.	0	2	10	18	24	34	51	84	100	...	130	.781	.219

The density of the aggregate was computed from the specific gravity and the unit weight. The density refers to the total volume of solids in the mass. The voids in the aggregate is the complement of the density.

MIXING CONCRETE

These studies covered mixing periods of ¼ to 10 minutes. The cement, water and aggregate for the batch were all weighed or measured and placed in the mixing drum before the mixer was started. The mixing period was measured from the time the mixer was started to the beginning of discharge.

In series 93 a parallel set of compression cylinders was made, using hand-mixed concrete made in the manner regularly followed in concrete tests in this laboratory. In these tests a batch of concrete was proportioned of the size required for one cylinder (about 1/5 cu. ft.); each batch was mixed by hand with a trowel in a shallow metal pan. The methods of molding, etc., were the same for all specimens. These tests were carried out for the purpose of securing a direct comparison between the strength of hand-mixed and machine-mixed concrete.

The different rates of rotation of the mixer drum used in Series 96 were secured by shifting the driving belt to pulleys of different size or by varying the speed of the motor.

The water tank which supplied the concrete mixer was calibrated in such a way that accurate readings of the quantity of water could be secured. Both hot and cold water were available for mixing purposes. The variations in temperature of mixing water in Series 97 were secured by this means. The extremely low temperatures were reached by placing ice in the water tank. The temperatures near the boiling point were obtained by heating the water tank by means of gas jets.

Fig. 2 shows the mixer used in these tests. The water tank can be seen in the background. In the foreground is shown a trough which was used for receiving the batch as it was discharged from the

mixer. The trough is about 5 by 14 in. in section, 15 ft. long; the bottom is lined with galvanized sheet steel; partitions of ⅛-in. steel plates are provided at intervals of about 15 in. The sides are sloped slightly to facilitate placing the partitions. It is mounted on castors in such a way that it can be pulled over the floor so as to distribute the concrete throughout its length as the mixer is discharged. The partitions prevent the concrete from flowing from one point to another in the batches mixed to very wet consistencies.

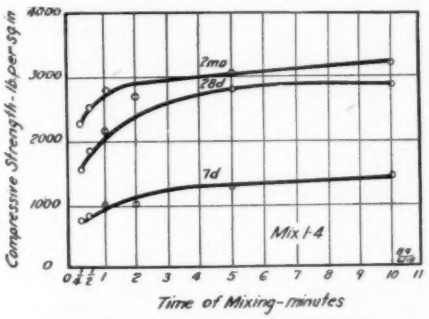


FIG. 3—EFFECT OF TIME OF MIXING ON THE STRENGTH OF CONCRETE

Series 89—Each value is the average of 24 compression tests of 6 by 12 in. cylinders from batches of 6 different consistencies. Compare Figs. 11, 12, 13, 14 and 15.

Test Pieces

Most of the tests covered in this report consist of compression tests of 6 by 12-in. concrete cylinders. The wear tests in Series 89 were made on concrete blocks 8 in. square and 5 in. in thickness. The hand-mixed specimens in Series 93 were each mixed and proportioned separately. All proportions are expressed in terms of the volume of cement and mixed aggregate. For instance, a 1-4 mix would be made up of 1 cu. ft. of cement (equivalent to 1 sack) and 4 cu. ft. of aggregate, without regard to the size of grading of the aggregate. A 1-4 mix was used in most of the tests; this corresponds to the usual 1-2-3 or 1-1½-3 mix. The exact equivalent of the 1-4 mix expressed in the customary manner would vary with the size and grading of the aggregates.

The consistency of concrete was varied in most of the series. In the tables and diagrams we have used the term "relative consistency." What we have called "100 per cent consistency" is a plastic mix which when molded in the form of a 6 by 12-in. cylinder will show a shortening of about ¼ to ½ in. if the steel form is slipped off immediately after molding. The quantity of water required to produce this condition varies, of course, with the proportions of the mix, the grading and absorption of the aggregate, etc. Other consistencies for the same mix are expressed in terms of the quantity of water required to produce "normal consistency," *e.g.*, 90 per cent or 150 per cent. It should not be assumed that this "normal consistency" gives concrete of the highest strength. Highest strength has generally been found at consistencies around 90 per cent of normal.

While the method of expressing the consistency by reference to a certain "normal" is most convenient, it should be stated that the method of testing for this consistency described above is not entirely satisfactory. For lean mixes or for aggregates of unusual fineness or coarseness, the test does not give concordant results.

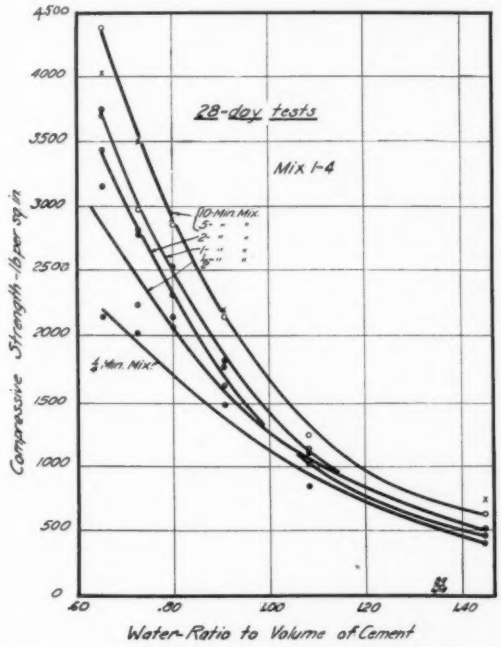


FIG. 4—INFLUENCE OF WATER ON THE STRENGTH OF CONCRETE

Series 89—Water-strength curves for each time of mixing. Each value is the average of 4 tests from the same batch. Water content calculated as a ratio of the volume of cement. Similar curves may be drawn from data for tests made at 7 days and 2 months. Compare Figs. 5, 16, 17, 24 and 30.

A penetration test for consistency was used in Series 97. In this test a bar ¾ in. in diameter, 24 in. long, weighing 1¾ lb., was used. The bar was made of thin brass tubing with a pointed steel shoe at one end. The steel point was tapered from 1/16 in. to ¾ in. in a length of 2 in. It was held in a vertical position over the top of the cylinder with the pointed end in contact with the fresh concrete. Upon being released the bar falling of its own weight penetrated the concrete to a certain

distance depending on the viscosity of the mass. This test was repeated several times, the depth of penetration in inches measured and the average recorded. If the point struck a large piece of aggregate and did not penetrate, that trial was not considered.

This method gave fair results in Series 97. However, it should be borne in mind that only one mix was used and there was no variation in the character of grading of the aggregate. The method is not satisfactory for wide ranges of mixes or grading of aggregates, but appears to be promising for use where only a limited range in the character of the concrete will be encountered.

The amount of water used in the batch exerts such a controlling influence that the quality of the

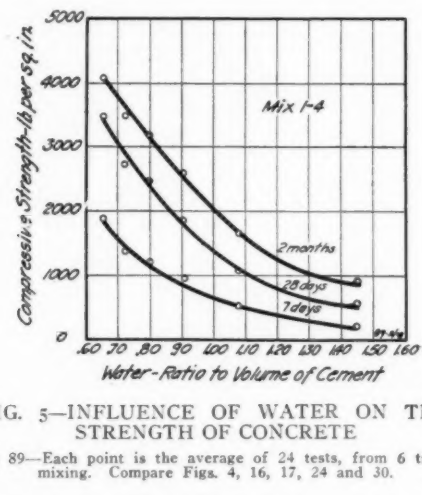


FIG. 5—INFLUENCE OF WATER ON THE STRENGTH OF CONCRETE

Series 89—Each point is the average of 24 tests, from 6 times of mixing. Compare Figs. 4, 16, 17, 24 and 30.

concrete depends very largely on this factor. The quantity of water to be used depends on the following factors:

(1) The quantity of cement (mix).
(2) The normal consistency of the cement.
(3) The size and grading of the aggregate.
(4) The absorption of the aggregate.
(5) The moisture already present in the aggregate.
(6) The nature of the work; that is, the size of the members, the methods of handling, placing, finishing, etc.

The term "consistency" as used in this article refers to the physical condition of the fresh concrete with reference to viscosity or plasticity and not to the quantity of water. It has been found convenient to express the quantity of water used in the concrete in terms of the volume of cement. This ratio has been found to be the best criterion of the strength of the concrete. The whole question of consistency has been studied, but it is not feasible to take up a detailed discussion of these studies in the present article.

The 6 by 12-in. compression cylinders were molded in metal forms made of 12-in. lengths of 6-in. inside diameter cold drawn steel tubing which had been split along one element by means of a thin slotter. The form was closed by a circumferential band. Each form stood on a machined, cast-iron base plate. A sheet of paraffined tissue paper was placed between the base plate and the cylinder form.

The concrete for the machine-mixed batches was taken from the receiving trough by means of a large scoop. In molding the cylinder the form was filled about one-third full and the concrete puddled with a ¾-in. steel bar about 21 in. long. This process was continued until the form was filled. The top was leveled off with a bricklayer's trowel. About three to six hours after molding, a thin layer of neat cement paste (which was mixed at the same time or before the concrete) was spread over the top of the cylinder. A piece of plate glass and a sheet of paraffined paper was used to form a cap which made a smooth, square end for loading. The glass remained in place until the form was removed. This method of capping is much better than setting the specimens in plaster of paris or cement-plaster caps immediately before testing. It has the following advantages:

(1) The cap is just as strong and stiff as the concrete and forms an integral part of the specimen.
(2) The time and labor required is a small part of that necessary with the plaster method.
(3) The plate glass prevents evaporation of water during the period the concrete is in the form.
(4) The cylinder is ready for test at any time without further preparation.

The forms for the wear blocks were made in gangs of three. The forms were set on a sheet of building paper laid directly on the concrete floor. Each form was filled before puddling. The top was leveled off with a trowel. After a period of one to two hours the tops of the blocks were finished by hand with a wood float. Instead of capping, the blocks were covered with a sheet of wet building paper and about 3 in. of damp sand. This method prevented loss of water while the blocks were in the forms.

All test pieces were allowed to remain in the metal forms overnight. Upon removal of the forms they were stored in damp sand in the basement. The compression cylinders were not removed from the damp sand until immediately preceding their test. The wear blocks, however, were allowed to dry out in an open room for two days prior to testing.

The machine-mixed batches consisted of 15 to 17 specimens. The specimens were made and numbered in the same order in all cases. The material which was first discharged from the mixer was used to make Specimen 1; the material last discharged forms the last specimen from the batch. In assigning the test pieces to be tested at each age, the specimens were distributed throughout the batch.

(To be continued)

Useless Waste in Concrete Construction Due to Legal Requirements

By W. STUART TAIT, *Assoc. M. Am. Soc. C. E., Assoc. Mem. Inst. C. E.**

[The wide diversity of building code requirements in this country is a source of waste in many instances. It is a well-recognized fact that there is no valid reason for these differences because a material is as strong in one city as in another and mathematical laws are universal in their application, regardless of locality. These differences affect property values because they result in a serious burden in a city whose building code requires unnecessary construction costs.

Cities better favored in this respect profit in increased population and real estate values. Their commercial prosperity is directly affected by the laws pertaining to building construction regardless of the class of buildings, because the cost of buildings directly or indirectly affects every inhabitant of a city.

The architect and engineer not only have a personal interest in building costs for business reasons, but as good citizens they have the interests of the public to consider. Now is the opportune time for architects, engineers, real-estate owners and all others to scrutinize building codes and labor to the end that they be revised to meet the requirements of stability, durability, fire-resistance and public health with the utmost economy in materials and labor. These articles will indicate some of the many ways in which these economies can be effected and are worthy of careful consideration.]

DURING the past four years material and labor costs have advanced to such an extent that buildings are now costing almost twice as much as the same structures did in the early part of 1914. There is a general feeling among those connected with building construction that building costs prevailing before the war will not be equaled again for a number of years, if ever. Up to the beginning of the world war a large portion of the common labor of the United States was furnished as a result of immigration. With this immigration entirely shut off and with the prospects that it will be a number of years before immigration reaches any material proportion again, it is apparent that all classes of manual labor will be paid higher rates in the coming years than they were paid before the war. Some extortionate rates now in effect will, of course, be modified in the course of time, but it is very doubtful whether labor prices will ever reach the level of 1914 again. With labor costs governing to a marked degree the cost of building materials and building construction, the time would appear opportune for a distinctly closer co-operation between the architect, the engineer, the building department, and the general contractor, with the object of reducing building costs by less wasteful use of material. Without closer co-operation between these four classes steps cannot be taken to offset the increased costs of material and labor by the more efficient use of material and by the application of more advanced methods of design than was possible, say ten or fifteen years ago. Co-operation between the four classes referred to above is essential in order that each of the four parties may at all times be satisfied that the other three intend to live up, in every way, to the intent of the design and specifications, and to produce carefully executed designs and reasonably perfect work. In order to compete successfully with world trade the industries of the United States must be provided with buildings of economical first cost in order to assist them to compete with the cheaper labor and consequent cheaper buildings and manufacturing costs prevailing in Europe. In the case of manufacturing buildings and warehouses the cost of the bare skeleton, consisting of the foundations, the columns and the floor construction, amounts to over half the total cost of the improvement. This item of cost, therefore, is the one which offers the most promising opportunity for material cost reduction. Warehouses and factory construction may be broadly listed under three main classifications, namely, mill construction, steel construction and reinforced concrete. Of the three, steel construction has been largely eliminated by war conditions, and the War Industries Board has recommended that wherever possible this type of building be avoided. This same condition will continue, to a less marked degree, for some years after peace comes, on account, first, of the demands of steel for European reconstruction, and, second, the requirements of our railroads and other public utilities for rehabilitation and expansions which must be undertaken promptly. For some types of factories mill construction, its advocates have claimed, has advantages, but with more economical concrete construction financial considerations will overcome these claims. The factories and warehouses, then, of the future will be of concrete construction to a larger extent even than they have been in the past.

The object of this series of articles is to draw attention to the developments which have taken place in the analytical side of reinforced concrete design, to the improvements which have taken place in the materials used in reinforced concrete, and to

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draw attention to the fact that there is now in existence a large force of skilled mechanics and general contractors who are fitted to construct reinforced concrete in a manner infinitely superior to that in existence when the basis of the present methods of design and stresses allowed, were established.

During the period from fifteen to twenty years ago there was little reinforced concrete construction, and the knowledge of the methods of its design was even more limited than its application. In the period of ten to fifteen years ago building departments and engineering bodies drew up and decided upon the methods of calculation for designing reinforced concrete and determined upon the factor of safety to be used, or to express it more exactly, set down the stresses which would be acceptable in these methods of design. During the past ten years numerous additional building codes have been prepared and other codes revised and modified, but it would appear that the engineering body had allowed its decisions to be governed more by the precedents laid down previously than by approaching the matter with an open mind and giving the more recent theoretical developments and actual strengths as shown in our testing laboratories, due consideration. It would appear, therefore, that a careful review of the basic principles of the design of reinforced concrete be presented so that one may examine the present methods of building design in the light of our present knowledge and to think of reinforced concrete construction strength as we now know them to be rather than to consider concrete, for example, as having a safe extreme fiber strength in bending as somewhere between 600 and 800 lb. per square inch, according to the building department under which one is designing. The important feature to be determined is the factor of safety which must be used in order to provide buildings which shall prove safe, stable and satisfactory. In determining the factor of safety to be used a very large number of conditions must be considered. Mr. J. A. Ewing, in his "Strength of Materials," states as follows:

"The choice of a factor of safety depends on many considerations, such as the probable accuracy of the estimated loads and also that of the theory on which the calculation of the working stress has been based; the uniformity of the material dealt with, and the extent to which its strength may be expected to conform to the assumed value or to the values determined by experiments on samples; the possible effects of bad workmanship in causing a deviation from the specified dimensions when the structure is actually built; the degree to which the materials may be expected to deteriorate in time or by exposure to variations of temperature. Another important consideration in the choice of the factor of safety is the variability or uniformity of the load: for reasons which will appear presently a larger factor is properly chosen when the load is subject to repeated changes. When the loads are such as to cause alterations of stress from tension to compression it is especially important that the working stress should not even approach the elastic limit of the material. The factor of safety also serves to provide for the incidental shocks which may occur in consequence of sudden variations in the load. Such shocks cause supplementary stresses which can scarcely be made subjects of calculation."

The conditions stated by Mr. Ewing above may be roughly divided into the following clauses:

1. Use of the structure under consideration.
2. Correctness of design and analytical methods.
3. Uniformity of material strengths and workmanship.
4. Knowledge of material strengths.
5. Possible deterioration of structural members.

After due consideration has been given to these conditions the factor of safety to be used may be established. Now, as a result of the large volume of experiments made at our university laboratories, we are in a position at this time to know very definitely the ultimate strength of reinforced concrete construction, and by applying the factor of safety determined, arrive at the stresses to be used. The experimental data developed at our universities and the knowledge which our engineering forces have through experience acquired, to a marked and apparent extent, removed the doubts and uncertainties regarding the strength and action of reinforced concrete and thereby a "factor of inexperience or ignorance" must no longer be provided in the factor of safety determined upon.

It is the object of the series of articles to follow to lay before this journal's readers arguments in favor of reducing, under proper safeguards, the design requirements now in force and to endeavor to demonstrate that the accepted standards of concrete design as dictated by our building codes are now unnecessarily conservative, and that the time is ripe for a material readjustment of these codes. The severe regulations covering concrete construction now in force put a heavy and unnecessary financial burden upon those who build, and with direct taxation greatly increased, the architect, the engineer, the contractor and the building inspector would be doing their share in assisting in the post-bellum industrial development of the United States by co-operating actively for the establishment of more logical and reasonable building regulations.

(To be continued)

Industrial Information

In this Department there is published each week information as to the development of materials and methods, derived from reliable sources.

Some Art Metal Products

In a series of pamphlets issued by the Art Metal Construction Co., Jamestown, N. Y., many valuable suggestions may be obtained. They cover the subject of filing methods and equipment from all angles, and discuss the widely differing needs of banks, libraries, architects' offices, and other places where filing is an important need. Several novelties made by this company to increase efficiency, as described below, are also illustrated.

First let it be stated that so fire-resisting and water-proof have these safes and cabinets been proved, that a very elaborate guarantee is given with each installation. To show the confidence the makers repose in their product, the following extract is made from this guarantee:

1. To give you with each safe—premium paid for one year—a bond from the United States Fidelity & Guaranty Co., of Baltimore, Md., covering loss on account of injury to the structure of the safe through burglary.

2. By reason of this bond or policy, you will be able to insure the contents of such a safe against burglary at 50 per cent of the prevailing rate in force when and where the policy is issued.

3. It is further guaranteed that you will be able to secure fire insurance on the valuable papers, etc., at a rate not to exceed $1 per $1,000.

4. It is guaranteed for a period of twenty years from date of purchase to replace without charge any Art Metal Safe which may be so badly damaged in fire that it cannot be used again.

One of these pamphlets is devoted exclusively to the library. Here are illustrated with photographs and plans many of the well-known institutions of this kind throughout the country. The adaptability and use of Art Metal library furniture and fixtures are, of course, fully discussed. Planning the library for protection and service is done by means of Art Metal equipment in the most adequate way.

A second pamphlet covers in the same ample way the subject of bank buildings. One of the valuable features here described is a vault truck. This is an easily movable filing cabinet used where it is frequently desired to carry a large number of heavy books from one department to another. Instead of making several trips, the vault truck in which these records are filed may be wheeled along in one trip to the point where it is wanted.

The Art Metal Planfile for architects will be described hereafter. All these things are made to be enduring and sightly, and have much to commend them.

Cold Weather Work

Now that winter is here, and the demand for new buildings is urging rapidity of fulfillment, it is interesting to note a form of exterior wall construction which can be carried forward successfully in even the coldest weather.

Elastica, a magnesite stucco, manufactured by the American Materials Co., 101 Park Avenue, New York, is a material which has filled this need in a very satisfactory manner where stucco is wanted.

As the name suggests, Elastica possesses qualities of expansion and contraction which adapt it to changing under surfaces, without impairing the surface effect of the stucco. This tends to prevent cracks and breaks due either to settling of the building or other causes. Unusual adhesion may be expected from Elastica, which is believed to cling tenaciously to the ordinary building materials, such as wood, stone, brick and cement. This, combined with the fact that it does not crack, prevents the stucco from separating from its foundation, and accordingly keeps out draughts and moisture. Tests readily made with Elastica will show it to be waterproof.

The factor, Magnesite, as it exists in the composition of this material, is claimed to be fire resisting. It is also immune to heat and cold, a non-conductor which makes for uniformity of temperature within the house, cooler in summer and warmer in winter.

Attention has been called to the fact that it will not freeze; it is not mixed with water, and, therefore, building upon which exterior work has been abandoned because of cold weather may be resumed at any time with Elastica.

Another feature in favor of this material is the fact that it comes already mixed, a uniform product carefully tested in the factory where it is made. This takes a responsibility away from the incompetent or inexpert workman who mixes material on the job.

Elastica has wide application for renovating old buildings. A frame house to be kept in condition

should be painted every two or three years. By putting Elastica on an old frame house, repairing and painting are largely eliminated, and the house is made to share the advantages of this material as above described.

Wire Glass

A series of important pamphlets has been issued by the Mississippi Wire Glass Co., New York, Chicago and St. Louis, bearing on the subject of wire glass for window glazing.

Wire glass is particularly valuable for the reason that it is fire retardant. Reports of the fire commissioner of New York and other authoritative comments would seem to substantiate the truth of this statement. These reports may be obtained by architects for the asking, and will be found of interest when read.

If wire glass is set in approved metal frames, a very good form of window protection will result, because a window constantly in use must receive proper care and attention, and is easily operated. Equipped with automatic closing devices, simple and sensitive to heat, the window, if open when a fire breaks out, responds readily and forms a fire barrier. Should fire occur on any floor during the day or night, it is immediately visible, and no time need be lost by the fire department in locating it.

Wire glass is translucent; the entering light is therefore diffused, and in cases where employees are obliged to face the sun, discomfort is minimized. By its use those in its vicinity are protected from injury as a result of falling, broken glass.

The Government in recent building projects has been a large user of Mississippi Wire Glass, and many important installations have been made throughout the country. Samples will be sent free upon request.

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COOLIDGE & CARLSON, *ARCHITECTS*